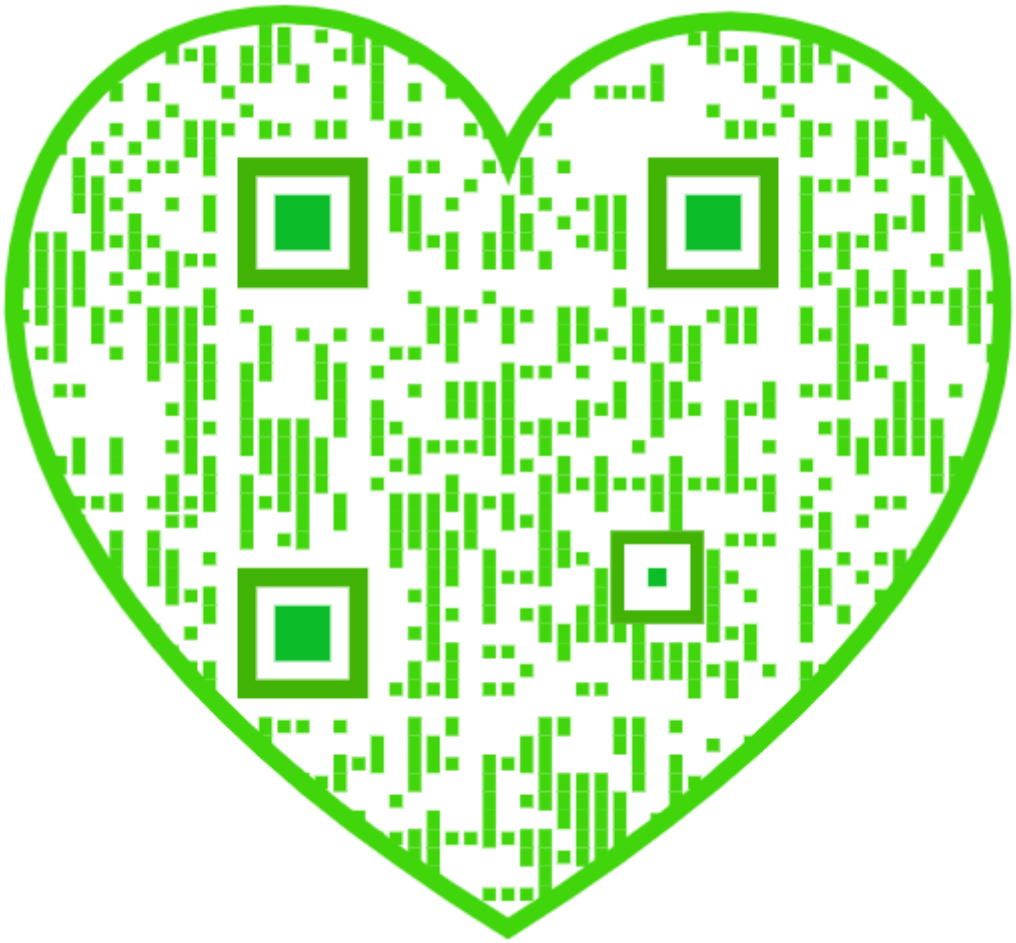

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KEY TO PRONUNCIATION.

ä	far, father
ā	fate, hate
a or ă	at, fat
ã	air, care
ạ	ado, sofa
â	all, fall
ch	choose, church
ē	eel, we
e or ĕ	bed, end
ė	her, over: also Fr. *e*, as in *de; eu*, as in *neuf;* and *oeu*, as in *boeuf, coeur;* Ger. *ö* (or *oe*), as in *ökonomie.*
ẹ	befall, elope
ē	agent, trident
ff	off, trough
g	gas, get
gw	anguish, guava
h	hat, hot
h or H	Ger. *ch*, as in *nicht, wacht*
hw	what
ī	file, ice
i or ĭ	him, it
î	between e and i, mostly in Oriental final syllables, as, Ferid-ud-din
j	gem, genius
kw	quaint, quite
ṅ	Fr. nasal *m* or *n*, as in *embonpoint, Jean, temps*
ñ	Span. *ñ*, as in *cañon* (cän'yŏn), *piñon* (pēn'yōn)
ng	mingle, singing
nk	bank, ink
ō	no, open
o or ŏ	not, on
ô	corn, nor
ȯ	atom, symbol
o͝o	book, look
oi	oil, soil; also Ger. *eu*, as in *beutel*
ö or oo	fool, rule
ou or ow	allow, bowsprit
s	satisfy, sauce
sh	show, sure
th	thick, thin
t͟h	father, thither
ū	mute, use
u or ŭ	but, us
u͝	pull, put
ü	between u and e, as in Fr. *sur*, Ger. *Müller*
v	of, very
y	(consonantal) yes, young
z	pleasant, rose
zh	azure, pleasure
′ (prime), ″ (secondary)	accents, to indicate syllabic stress

THE ENCYCLOPEDIA AMERICANA

Municipal Accounting may be termed a by-product of increasing municipal activity. This began with what is commonly known as the industrial revolution. The establishment of the factory system, the abandoning of home production or the "domestic system," the drift of population away from country estates and agricultural employment, the increased need for making provision for the health, comfort, convenience, and for the social order of crowded settlements and fast growing cities have forced on local government activities which have made its officers responsible agents for great business corporations. Within a few decades the small trading towns on the coast and inland lines of transportation in England and continental Europe had grown from mere villages, or a collection of villages, to the proportions of cities; and the proper administration of government came to involve expenditures of millions where before only hundreds or thousands of public revenues were required. In the borough or the town the officer had immediate contact with every detail of public expense and his own experience was sufficient guide to administrative control. Increase in municipal functions forced him to rely on employees and agents, and he soon came to be dependent on them for a knowledge of details; an understanding of the financial transactions of the larger community could be had only through a well devised system of accounts.

Accounting is a method of collecting, classifying and co-ordinating the financial data pertaining to an enterprise, public or private. As a method of collection, accountancy attempts to make a complete record of financial transactions; as a method of classification it aims to assign accurately each financial fact to an administrative department or category to which it properly belongs; as a means of final co-ordination its object is to finally bring all the data to a single subject of account into form for a complete understanding of related details. Thus by process of original record and restatement, not only does a system of accounts give a complete history of the business as a whole but also a chronological, as well as summarized, statement of transactions pertaining to each administrative interest; and, through final summaries, exact knowledge may be brought to the attention of the administrator of every relation that is important in the management of affairs. Judged, therefore, both from its methods and from its results, accountancy has come to be a true science of financial record — a science which is fundamental to controlling judgment, both with respect to past operation, and as pertaining to provisions to be made for the future, in enterprises that are too large for the personal contact of a single head.

In the development of methods which will properly record financial transactions and reduce these records to reliable statistical statements, accounting has followed all the transformations of business itself. With each advance in complexity, and with each widening of the scope of enterprise the adoption of an improved system of records which will insure authentic results have been imperative. Private concerns have been able to survive under such conditions only that those in control may have a complete mastery over details. When intelligent direction has become impossible the private institution has failed and its business has passed to its competitors. Scientific accounting methods were first worked out in private life as a matter of survival. The public corporation, however, has not been subject to this law. Peace and social order must be preserved at any cost; public health must be protected; public convenience has commanded service of the government as the only institution which could properly represent the public welfare. The government could not die and the corporation, empowered with governing activities, has been allowed to pass on from generation to generation inheriting methods which were inaugurated under conditions that required little or no provision made for authentic record of official conduct.

Analogy with private business may still further illustrate present conditions of municipal accounts. From primitive to modern accounting there have been three steps, namely: A system of partial accounting and two systems of com-

plete accounting. The two systems of complete accounting are commonly known as "Single Entry" and "Double Entry." Of these two last named, Single Entry is the more primitive. Single entry accounts attempt to make a complete record of transactions, but in classification the financial data are finally co-ordinated around proprietary interests only. Single entry accounts attempt to state proprietary assets and proprietary liabilities, but do not record anything with respect to current business operation. In these, under the single entry system, profits are arrived at through balancing off appraised valuation of assets against liabilities. No attempt is made to show current operations and no account is taken of earnings and expense. With the introduction of highly complicated and highly centralized industrial and commercial organization, under corporate control, most of the administrative problems came to be centred in operation — hence the necessity for the introduction of other accounts for the purposes of final classification. To provide such information the "Double Entry" system was devised. Under such an accounting plan not only may the cost of each article of product be determined, as a guide to estimating profit in price making on each particular sale, but the results in net earning of the gross business may be accurately determined from the books without inventory and valuation of assets and the closing of accounts representing proprietary assets and liabilities.

The public corporation and enterprises conducted by the government have been less fortunate in the development of methods which would show expenses (or cost of administration), revenue (or current income), transactions with respect to corporate properties, and liabilities outstanding. Municipal accounting has developed not as a condition necessary to survival but in response to a public demand for municipal reform. This movement first began in Europe and has reached its highest development in Great Britain where scientific accountancy had become first established as a necessary means of administrative control over large private undertakings. For public protection, the established methods of accounting were first applied to joint stock companies. Among the first Acts directed toward this end were those following railway speculation in the fourth and fifth decades of the century just closed. The abuses which had grown out of this character of promotion and the failures which had followed the absence of a strict financial control were the reasons for the enactment of the Companies Clauses Consolidation Act (8 Vict., c. 16). Under the provisions of this Act, auditors were to be appointed by the stockholders of corporations at their regular meeting, and these auditors were empowered to employ accountants to assist them in making special reports or in confirming the reports prepared by the officers themselves for the information of stockholders. The reports of auditors so appointed were to include a certificate as to the correctness of the balance sheet, in which was to be set forth the capital stock and credit liabilities, the accounts due to the company and the properties of every description. They were also to give a "distinct view of the profit and loss which shall have arisen in the transactions of the Company in the course of the preceding half year." It was further provided that no dividends should be declared except out of profits and that dividends should never be apportioned to stockholders when this would result in the impairment of capital resources. Gradually statutory provisions requiring appointment of auditors either by the stockholders of companies at their regular meetings or by the Board of Trade were extended to include public gasworks, public waterworks, commercial banking companies, savings banks, university and college estates, judicial trustees, county officers, etc. In the movement toward political reform a Local Government Board was finally created (1871) which would force upon all of the County Councils, Municipal Corporations, and Town Councils (except those of the larger cities) a uniform system of accounts, complete audits of account, and reports to the government of the financial operation as well as financial condition of local governing bodies. The same spirit of reform and the same necessity for providing a system which would furnish exact knowledge of details and summaries of results as a means of better administrative direction and control, induced the larger municipalities to employ professional accountants to instal improved systems of financial record and to audit their accounts periodically.

As it was in Great Britain that modern industry first found its highest development, so it was there that accountancy was first raised to the plane and dignity of a profession. The "Companies' Acts" and supplementary legislation requiring the appointment of independent auditors contributed much to the development of the science by making its requirements general in the management of large affairs. Instead of leaving the science to be slowly evolved by a process of natural selection of methods, the several Acts of Parliament, making audits and reports compulsory, immediately brought the talents of thousands to the task of specialization in this field. When the Local Government Board was organized, in 1871, the London Institute of Chartered Accountants (a chartered body of professional accountants) had already been in existence nearly twenty years and similar professional bodies had been organized among the accountants of Scotland and Ireland. The application of accounting methods to English municipal governments, therefore, was a comparatively easy task. The public corporation had grown too large for the effective use of partial and primitive systems of financial record; these had long since failed to serve the public administrative need. When English accountants were asked to turn their talent to municipal work they had simply to apply the principles and methods of scientific accounting to which they had long been accustomed (in the classification of financial data of gas companies, water companies, railways, and the large industrial and commercial corporations, making such changes only as were made necessary by the public character of the enterprise.

Theretofore municipal accounts had been little more than cash book entries and treasury statements; the efforts of local communities had been directed toward holding the officers of government to strict account in the handling of public funds. The first efforts toward reform were for the protection of the taxpayer against fraud and misappropriation. To this end a strict account of receipts and disbursements had

been required and the accounts and reports of municipalities were little more than detailed or classified statements of the public treasury. When, however, municipal functions had become multiplied and municipal activities had grown too complex to allow of an intelligent grasp of details by those in control, the futility of the cash book system became apparent. From the best records that might be made and the best summaries deducible from records of the flow of cash no notion might be had of the real problems of administration. What the officer would know and what the taxpayer was primarily interested in as a matter of strict economy was the current cost of government and the current revenue provisions to meet this cost. It was also necessary to have a complete accounting for the various properties belonging to the city (other than cash) and a complete statement of credit obligations. None of these results could be obtained from a record of receipts and disbursements. The municipalities had been using a system of partial account only, and the larger problems of financial administration which confronted them demanded not only a system of complete financial account but also one which would show both municipal operative results and transactions pertaining to municipal assets and liabilities — that is, a complete double entry system.

Applying the principles and the methods to which they were accustomed in the analysis of financial data and final summarization of accounts for the railway and other large private corporations accountants found that the categories necessary to show costs of administration were almost identical with what they had been accustomed to set up as the expense account of private undertakings; and in lieu of earnings in private accounts a statement must be made of current revenues accruing to meet expense incurred. The net result of these two classes of accounts would show revenue surplus and revenue deficit of the municipality for the year, or other period stated, instead of net earnings. In other words, these two classes of accounts exhibit the true financial results of municipal operation for the year, but none of the data collected in either class had any reference to cash receipts or cash disbursements. Under the double entry system, when an expense was incurred it was at once set up in its proper classification both as an expense and as a current liability of the city. The cash payment when finally made had no reference to the expense but simply operated to reduce amount of current liabilities and to correspondingly decrease the cash assets of the treasurer. On the other hand, revenues were spread upon the books as soon as they accrued and became payable; of these a double entry was made, first in a proper revenue account, and second as a current asset. Payment of revenue into the treasury or cash received did not in any manner affect the revenue account but operated to reduce an assets receivable account and to increase the amount of cash in the treasury.

While modern systems of accounting take no notice of the flow of cash as a means of showing the results of operation in net earnings or in revenue surplus or revenue deficit, receipts and disbursements become an important exhibit in those accounts intended to portray financial condition. These accounts are those ultimately collected in the balance sheet and are sometimes referred to as proprietary accounts to distinguish them from those designed to show results from operation. Municipal properties and municipal liabilities can be affected in only four ways: (1) They may be increased or decreased by cash transactions; (2) they may be increased or decreased by credit transactions; .(3) assets may be decreased by depreciation and liabilities may be increased by reserves set up to cover depreciation; and (4) assets may be decreased by loss of property or the liabilities may be increased by reserves set up to cover loss. To give a true picture, therefore, of transactions pertaining to proprietary assets and liabilities and as a means of holding officers to strict account, summaries must be shown representing present financial condition, and exhibits must be made which will properly set out the transactions of cash and credit, as well as the reserves or provision made to cover depreciation or loss, through which the changes in proprietary accounts have been affected. It is as a means of illuminating the cash assets account and of giving assurance as to the correctness of cash balances represented, only, that exhibits of receipts and disbursements are important.

Under the English system of municipal accounting the assets and liabilities or the accounts which are finally stated and summarized in the balance sheet are again divided into two classes, viz.: (1) Those showing current and contingent assets and liabilities and (2) those which show transactions and the final result of transactions pertaining to the permanent properties and the funded debt of municipalities. The latter of these two classes is set up in their reports as capital accounts. A statement of cash receipts and disbursements (or of transactions of the municipal treasury) with respect to these two classes of properties and liabilities is also distinguished. Cash receipts and disbursements which pertain to or affect current assets and liabilities are called ordinary, while those which pertain to or affect capital accounts are denominated extraordinary. These terms, however, pertain to no other class of accounts than cash and have no real significance in exhibits other than detailed or classified statements of receipts and disbursements.

In America, accounting ideals long languished and financial records were retained in innocent simplicity and primitive confusion long after the science had become well established in England and Scotland. During the period that accountancy was being erected on the high plane of a profession in Europe, commerce and industry were on the Western Continent first beginning to feel the need for a method which would insure integrity of summaries of financial results. Till the middle of the 19th century America was a highly individualistic agricultural community. The American farmer needed no accounts other than a simple statement of cash receipts and payment and a memorandum of credit obligations. Before 1830 the bank was about the only enterprise of large capital and its transactions were treated as cash. In 1820 the city population of the United States was only 4.93 per cent and there were only 13 cities having a population over 8,000. The census of 1850 showed an urban population of only 12.49 per cent; at this time the American Transportation Company was about the only concern

whose volume of business and breadth of organization demanded a modern method of account. And it has been in the railway service that most of the American accountants have received their training.

After the Civil War, industrial and commercial enterprises came to take so prominent a place in our national life that the current of population set strongly toward the city and a process of centralization was begun similar to that felt by Great Britain about a century before. In 1900, about one half of our population was found by the census takers in large cities, and, in the most highly industrial portion, namely, the North Atlantic Division, only 31.8 per cent remained in rural employment. The sudden development of the municipalities, the hopeless chaos in municipal administration, the known mal-practice in public office, and the abortive attempts on the part of honest officials to locate responsibilities as well as protect themselves against the suspicion of corruption which the public had come to entertain toward all those connected with local government (as a result of the peculations of the few and of the organized political plunder to which the public treasury was subject) have within the last two decades raised up a universal demand for municipal reform which has brought the combined intelligence of honest citizenship to the solution of the means necessary to its accomplishment. In America, as in England and in continental Europe, attention was first called to attacks on the public treasury and to the subversion of public funds to private use. As a means of protecting the taxpayer against the misapplication of cash received, the first step toward reform was the creation and election of independent treasury officials and the publication of detailed treasury reports. These have served as a protection against fraudulent inroads on the treasury, but have done much to confuse ideals of municipal accounting with statements of receipts and disbursements.

The need for a system of complete accounting in American municipalities as a first premise to municipal reform has in recent years been enlarged on by many, but by none has it been more forcefully expressed than by Nathan Matthews, Jr., of Boston, who was elected mayor of that city in 1891. Boston at that time was better equipped, perhaps, than any other American city for furnishing the kind of data needed for an intelligent administration, yet Mr. Matthews in his first report calls the attention of the people to their helplessness in the following language:

> Called to the chief magistracy of the city without previous service in the government and believing that the first duty of a public officer charged with the disbursement of millions of dollars of public moneys was to search the printed reports of the city government for accounts that would show the cost from year to year, of equipping and of maintaining the various departments of municipal service, I was amazed to discover that practically there was none. I have in consequence been obliged to devote an inordinate amount of time to the work of securing this information and of arranging it in convenient form for use, the time thus spent amounting to several hours per day for weeks at a stretch.

In this statement Mayor Matthews brought into strong contrast the cash account system and the needs of the administration for authentic statements and summaries of accounts which will show "the costs from year to year of equipping and of maintaining the various departments of municipal service" as well as the revenue provisions made by government for meeting this expense.

In many departments of our large cities even memoranda of account were found to be almost entirely lacking. The Comptroller of Chicago in his report (1897) points to the confusion in the Special Assessment Bureau as follows,

> Too severe criticism cannot be made upon the lack of system prevalent and the absolute neglect to post the books of accounts in the Special Assessment Bureau of the Department of Public Works in past administrations. It was discovered by this administration soon after it came into office that the books of account of that Bureau were more than five years unposted.

As late as 1901 the Fassett Commission investigating the accounting methods of the cities of the State of New York reported

> That the system of accounting in the several cities is more unintelligible and chaotic even than the laws under which the cities themselves are administered. . . . We believe that there can be no wise legislation with reference to the government of cities unless it be possible for the officers of the State, and especially for the Legislature and the Governor, to be able at all times to know with definiteness and certainty the facts relative to the general condition of municipal administration in each of the cities, and more particularly the exact financial situation in each and all of them.

The general awakening in America has not been without results. The city of Boston under the revised ordinance of 1898 empowered the City Auditor with the approval of the Mayor to designate expert accountants to examine the books and departments periodically. In a number of the States a movement has been inaugurated to create a board, or officer, of central control over municipalities and local governing bodies with powers similar to those enjoyed by the Local Government Board of Great Britain. The State of Ohio has recently enacted a complete Municipal Code which applies to the principal cities and towns of the State, giving them uniformity of administrative organization and which provides for a system of accounts that will show revenue and expense. The same law enacted a State Auditor or Comptroller of Municipal Accounts, with power to prescribe forms and to require reports which will insure accounting results. Other States have introduced uniformity in accounts for county and town organizations. Generally speaking, however, American municipalities and local governing bodies are still attempting to work out their administrative problems from the cash book and even in States where the law requires a statement of revenue and expenses, attempts are made to reach such a result through supplementary schedules, still making the treasury statement of receipts and disbursements the principal feature of their system. American municipal accounting officers have not yet risen to the dignity of professional accountants; few of them have such a knowledge of the principles and methods of accounting that they appreciate the futility of the cash book system. Even in cities like New York and Boston the cash book system is still retained. Their reports show little else than the flow of cash as exhibited in summaries of receipts and disbursements. Neither the officers of American cities in responsible positions, nor the taxpayers have any means of determining from such a system current expenses or annual cost of administration; no accurate statement may be made of revenue accruing to cover costs; there is no intelligent guide in making appropriations and no means of

ascertaining revenue surplus or revenue deficit; budgetary estimates as a basis for taxation, and statements of revenue and expenses as a guide to administration, are rendered impossible except through such process of rough approximation as that described by Mr. Matthews in his report to the citizens of Boston.

Chicago was the first large American city to adopt a system of accounts adequate to meet administrative needs. As shown in a paper recently read before the Detroit Conference of the National Municipal League (April 1903),

> Within fifty years Chicago had grown from a village to a municipality of two millions; it had begun with a small town organization, as its population and territorial jurisdiction had spread over the surrounding prairies and swamps, primitive local governments had been incorporated by consolidation rather than by process of readjustment and reorganization. . . . The City of Chicago had finally come to include more than twenty separate taxing jurisdictions, over which it had little control and between which there was no well defined method of co-operation for common ends; the financial side of the administration had become unmanageable and the government in all its activities was crippled. Recognition of this situation on the part both of citizens and of officers of administration was the first step towards reform. Citizen activity and discontent were in evidence on every side.

The Mayor and Council were alive both to the public demand and to the probable results of public censure in case their own incumbency was not relieved from suspicions which were sure to follow. As a result, Haskins and Sells, public accountants, were employed to devise and instal a complete system of accounts which would meet the administrative needs of the city. The general features of the new system adopted as a result of this employment closely follow that in use by the English municipalities. In each department and office is kept a complete record (or original entries) of all financial transactions pertaining thereto. These are finally collected in the Comptroller's office, and co-ordinated in final summaries of revenues and expense (or operative results) and assets and liabilities (or statements of financial condition). The important administrative features of this system are represented in detail in the report of the Comptroller for the year 1902, as follows: (1) Uniformity of accounting methods in all departments; (2) Concentration of accounting in the Comptroller's office; (3) Collection of all revenue by the City Collector; (4) Daily remittances; (5) Monthly reports to the Comptroller and monthly balances between the Comptroller and all departments; (6) Financial reports published monthly by the Comptroller; (7) The organization of an Audit Bureau and a methodical plan of auditing by officers and employes retained especially for that purpose independent of all departments; (8) Accrument of all revenues on the general books of the city where they stand as evidence of obligations due to the city until paid; (9) Approval of all contracts and requisitions for supplies by the Comptroller to prevent departments from incurring liabilities in excess of appropriations; (10) The issuance of all fiscal stationery, forms, and receipts, consecutively numbered by the Comptroller and holding the departments responsible for their use or cancellation; (11) The use of graduated stubs or coupon receipts for the collection of money; (12) The establishment of a complete chain of accounting from the inception of revenue and expense throughout the various branches of the city to the Comptroller's office, where all of the auditing is finally concentrated.

The administrative results of such a system are also set out in the same report. The installation was so managed so as not to interfere with the current business of the city; the work was simplified in such a manner that clerks of ordinary ability might perform the duties required; instead of making necessary an increased clerical force the annual administrative expense was reduced over $72,000; beside, the new system had "improved the efficiency of individual employees and promoted an intelligent and interested direction of their efforts by departmental heads." Another result of bringing revenues accrued prominently before the administration. There was an increase in cash collections of nearly $500,000 in miscellaneous revenues alone. It may be further noticed that in the report above referred to only a brief summary is made of cash receipts and disbursements, the books of the treasury and the audited voucher system of account being considered an adequate protection against official infidelity. The body of the Comptroller's report is devoted (1) to classified summaries and detailed exhibits of revenue and expense; and (2) to classified balance sheet summaries and detailed exhibits of municipal assets and liabilities.

Prominent among the many American societies which have taken a serious interest in municipal accounting reform, is the National Municipal League. This society was organized in 1894, and is composed of members and representatives of local reform organizations. In 1899 the League appointed a special committee to further the interest of uniform municipal accounting and statistics. The first task to which the committee put itself was to work out a classification of administrative interests and purposes which might serve as a basis for accounts and statistics. This classification was published in 1900, and formed a part of the "Municipal Program" of the League. The main interest of the committee being one of bringing the present accounts and reports of municipalities into such uniformity as would form a common basis for comparison, the classification and schedules adopted were applied by the committee to treasury accounts — or cash receipts and disbursements — only. As these schedules have been recognized and adopted by a large number of American municipalities and have been made the basis for the statement of treasury accounts a general outline is here set up.

RECEIPTS AND EXPENDITURES.

I. General Government.
- 1. Mayor — Office.
  - (a) Salary of Mayor.
  - (b) Other expenses of city executive.
- 2. Legislative.
  - (a) City Council.
  - (b) City Clerk.
- 3. Law Department.
- 4. Finance Department.
- 5. Bureau of Elections.
- 6. Public Printing.
- 7. Buildings not in other departments.
- 8. Registration.
- 9. Other general.

II. Protection of Life, Health and Property.
- 1. Police.
- 2. Fire Department.
- 3. Courts.
- 4. Jails, prisons and reformatories.
- 5. Health Department.
- 6. Cemeteries.
- 7. Building Department.

8. Militia and armories.
9. Miscellaneous.

III. PUBLIC CHARITY.
1. Hospitals.
2. Insane.
3. Houses for aged, deaf, dumb, blind, etc.
4. Almshouses and workhouses.
5. Lodging-houses.
6. Outdoor relief.
7. Miscellaneous.

IV. PUBLIC WORKS.
1. Administrative expenses.
2. Opening and grading streets.
3. Street paving.
4. Sidewalks.
5. Street cleaning.
6. Street sprinkling.
7. Street lighting.
8. Garbage collection and disposal.
9. Snow removal.
10. Sewers and sewage disposal.
11. Bridges.
12. Miscellaneous.

V. PUBLIC INDUSTRIES.
1. Waterworks.
2. Gasworks.
3. Electric light plants.
4. City real estate.
5. Markets.
6. Docks and wharves.
7. Transit subways.
8. Subways for pipes and wires.
9. Miscellaneous.

VI. PUBLIC EDUCATION, RECREATION AND ART
1. Schools.
2. Libraries.
3. Museums and art galleries.
4. Parks (*a*)
(*b*) Playgrounds.
(*c*) Gymnasia.
5. Baths.
6. Celebrations.
7. Miscellaneous.

VII. TRUST FUNDS.

VIII. MISCELLANEOUS.

IX. TAXATION.
1. Real property.
(*a*) Lands.
(*b*) Buildings.
2. Personal property.
3. Poll taxes.
4. Liquor licenses.
5. Franchise tax.
6. Receipts from franchise rights.
7. Special assessments.
(*a*) Street opening.
(*b*) Street paving.
(*c*) Sidewalks.
(*d*) Sewers.
(*e*) Other purposes.
8. Miscellaneous.

X. PUBLIC DEBT.
1. Interest.
2. Sinking fund.

XI. TOTALS OF RECEIPTS AND EXPENDITURES (TO THIS POINT).

XII. CASH BALANCES AT BEGINNING AND END OF FISCAL YEAR, RESPECTIVELY.

XIII. GRAND TOTALS OF BOTH SIDES OF THE ACCOUNT (BALANCED).

Having worked out a general classification of subjects of administrative interests, and having successfully applied these to the treasury accounts of American municipalities, the committee, under instructions from the National Municipal League, undertook to apply its schedules to the other controlling accounts and to report on a complete system of municipal accounting and statistics. For this purpose the double entry system was adopted and the detailed accounts were divided into two general classes, namely, (1) Operative Accounts, showing cost of municipal administration and municipal revenues accrued to meet the current expenses incurred, and (2) Proprietary Accounts, showing assets and liabilities. Thus, in general, they follow the plan adopted by the English municipalities and applied to this such a classification as a basis for co-ordination of financial items and details as are suited to American conditions. Recognizing the separate and independent organization of the office of Comptroller and the office of Treasurer under American municipal charters, separate outlines for reports by these two officers are planned, the report of the Comptroller to show all of the controlling accounts arranged in such manner as to exhibit a complete resumé of operations and financial conditions, the report of the Treasurer to exhibit the flow of cash and balances of cash on hand.

The awakened deep interest in municipal accounting is one of the most hopeful promises of permanent reform in municipal administration.

E. ALLEN FROST,
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Municipal Art Societies, organizations in the various large cities of the United States, devoted to the promotion of municipal art, and the making of the city beautiful. Among these organizations are the Municipal Art Societies of New York, Chicago, Cincinnati and Baltimore; the American Park and Out-Door Association; the Fairmount Park Association, etc. See ART, AMERICAN; PARK.

Municipal Debt. See DEBT; FINANCE, *Municipal.*

Municipal Government. Cities are centres of influence for good or ill. In industry, commerce, science, culture, thought, they lead the world and largely determine its destiny. If city populations are corrupt, immoral, illiterate, depraved, the whole nation is contaminated. If their government is a failure, the state is endangered, both because the cities have such a large proportion of the population and because the character of the whole country is so largely influenced by city conditions. New York city has a population greater than the 13 colonies when they broke away from Great Britain. Its wealth is 20 fold that of the United States when the Constitution was drafted. Its present annual expenditures are one fourth of those of the Federal government. Its net debt is one third of the national indebtedness, including the bonds still outstanding for the Civil War, and 30 fold the debt of New York State.

Growth of Cities.— Population is concentrating at a rapid rate. In 1900, there were 62 cities in the United States that had a population greater than New York in 1800. During the 19th century, the percentage of the population living in cities over 8,000 increased from 3.97 to 33.1. The number of such cities grew from 6 to 545, and their combined population from 210,873 to 24,992,199 — 118 fold; while the remainder of the country, including all towns below 8,000, grew from 5,097,610 to 50,485,268 — less than 10 fold.

The drift cityward is not confined to the United States. Every progressive country of the Eastern and Western hemispheres bears witness to the universal trend. In England and Wales, two thirds of the people live in cities over 8,000. In Prussia, Belgium and Holland the ratio is higher than in the United States; and in several other European and South American countries the proportion is nearly as large. The causes of urban growth are principally economic. The great improve-

ments in manufacture, mining, agriculture and transportation have made it possible for a larger and larger proportion of the population to turn to pursuits other than the extractive industries. Wants have multiplied with increasing wealth, and for their satisfaction, new industries have sprung up. Since nearly all industries outside of agriculture can be conducted better in populous centres than in rural localities, they have located in cities, and there the people connected with industry and commerce have concentrated. Others have been drawn cityward by social advantages — theatres, operas, libraries, schools, etc., for the cities are the centres of culture, art and science, as well as trade and industry.

Congestion of Population.— This increasing concentration signifies not merely the union of millions under one municipal government but, what is far more important, a congestion of population which has never been equaled. The steady reduction in the space allotted to each person and the piling of house upon house have brought within the confines of a single city block a larger number of persons than the whole population of some cities. According to the last census there were in the Eighth Assembly District of New York 72,125 persons. If the whole city were as densely populated, it would contain every man, woman and child in the United States, the Territories, all of the islands recently acquired and also Mexico and Canada — all of North America. Foreign cities do not have usually as many persons per unit of ground area as American cities; their buildings are not so high. London's densest quarter does not contain one half as many persons per square mile as the lower East Side of New York city. But there is great congestion and squalor in London, nevertheless.

From this congestion, the ceaseless contact of person with person, the great density, most of the problems of municipal government spring. Expensive health departments are not needed in the country; the individual protects himself against disease. Street paving and cleaning are simple problems. Each person looks after his own water supply, transportation, lighting, etc. Public service corporations cannot exist without thickly settled centres, and franchise questions do not perplex frontier districts. Home rule is not discussed. Even the village has a very simple form of government. In the city everything is changed. Elaborate health, fire, police, water supply and transportation systems are necessary. The citizen comes into too close and too constant contact with his fellows to be permitted to do as he pleases. There must be new laws, more administrative departments and a different form of government throughout. New problems arise, such as housing, home rule, public ownership and civil service — all of which, in ultimate analysis, find their origin in the great density of population.

City v. Country.— Although cities have existed ever since the dawn of authentic history, and although they have held at times absolute sway over the rest of humanity, the modern city is the outgrowth of the last century or of the last 150 years at the most. Down to the foundation of the Roman Empire, the city occupied the centre of the stage, dominating the country. During the Middle Ages, the country got the upper hand and kept it until the modern industrial era caused people to seek the towns and increased urban wealth and power in the commercial world by leaps and bounds. At the dawn of this era, wherever there was any sort of representative government, the rural communities controlled it, for the towns were small and not influential. As they grew in population and wealth, they naturally demanded a larger share in national affairs and more local autonomy. The country districts naturally were reluctant to grant either; and as they controlled the law-making power and the machinery for changing the constitution, they had their way. In England, the landed gentry and the "rotten boroughs" fought off all serious inroads into their power until the Reform Acts of 1832–5 were passed, and then a readjustment was achieved only through a revolution, although a peaceable one. On the Continent, the growing towns did not secure their fair share of influence until later. In certain countries they have not yet obtained it, and in the United States there are as extreme instances of high-handed domination of municipal affairs by country districts as existed in the 19th century anywhere. Of course, since cities grow so much more rapidly than the country, any system which apportions political power justly for the moment, must soon become obsolete. It is not this incidental injustice to which I refer, but to the deliberate refusal to give cities their fair representation in State affairs and to the constant intermeddling in matters which are purely local.

Rural Domination in the United States.— Only a few instances need be cited. In Connecticut, the State has been so gerrymandered that seven per cent of the population — rural districts — elect a majority to the House of Representatives. The 11 large manufacturing towns, containing one half of the population of the State, have 22 votes as compared with 233 votes held by the other half, the rural half of the State. No reapportionment in the House has been made since 1876, nor in the Senate since 1827. Even the moderate changes suggested by the constitutional convention of 1902, which still kept control in the hands of a few decaying, "rotten" rural districts, failed of adoption. In Rhode Island it is the same, and it is suggestive to note that these two commonwealths, among the oldest and most Puritanical of the original thirteen, are the most corrupt, depraved and debauched in political matters. This can not continue forever. The cities may not obtain the full share to which their population would entitle them, but they will compel the country to yield in the long run. The justice and equity of their demands must be recognized.

Home Rule for Cities.— The other half of the problem of the relation of city and State concerns the intrusion of the State into purely local matters, and here again history shows that this interference has been carried at times to the farthest extreme. The dispute between the king and the rural gentry was going on when the towns began to increase in wealth and population. The country had secured some degree of local autonomy, and its representatives had gotten some control over the law-making

authority. They objected to granting the towns a distinct local government, or, where this was done, insisted that the central government should have constant supervision. On the Continent, the general trend was to give the cities residuary powers, that is, to permit them to do anything which was not prohibited, but through the enactment of such laws, their powers were considerably curtailed. England started with frequent central interference in local matters, usually legislative and judicial, resulting in misgovernment, corruption and decreased efficiency in central administration. The report of the Commission on Municipal Corporations for 1835, reads like a description of recent American conditions. The Continent started with greater liberty, subject to administrative supervision, which was adopted in England in 1834 and since has been extended and substituted for legislative interference, which worked so badly. Thus, insular and continental Europe have been approaching the same goal, that is, a general grant of power and form of government, with local autonomy, subject to central administrative control, such as the approval of municipal loans and certain ordinances by the Local Government Board, the audit of accounts by the same authority and the inspection of police departments by the inspectors of the Secretary of State.

State Interference in the United States.— The experience of the United States shows the same tendency; and although no State has gone so far as England, France or Prussia, a beginning has been made. A brief outline must suffice. The first city charters, whether from the English crown, the colonial authorities or the early State legislatures, defined in few words the powers, duties and form of government. Particular attention was paid to financial powers and methods of selecting officials. The authority granting the charter frequently controlled these with a strong hand. For example, annual acts authorizing New York city to assess taxes were necessary down to 1874. The mayor was appointed by the governor until 1821. Up to the middle of the century, ordinances remained in force only for a limited time (three months to three years) unless approved by the colonial or State authorities. Boston did not receive a city charter until 1822. As the cities increased in size and wealth, a more elaborate system of government was necessary, and the States undertook to regulate in detail every minor as well as every major point. These provisions needed alteration from time to time, and the only recourse was to special acts of the legislature, which grew rapidly in number and scope. The distrust of city governments, due to the corruption and inefficiency so prevalent after the middle of the century, was a contributing cause, for the restriction of functions and the removal of discretionary power was thought to be a method of remedying the prevalent evils. Even the reformers themselves fled to the State capitols for legislation in preference to fighting out the battle locally.

Special Legislation.— Wherever these conditions existed, there appeared a mass of special legislation. In the 10 years from 1880 to 1889, the Fassett Legislative Committee reported that 1,284 acts were passed by the New York State legislature affecting the government of cities; nearly one half related to the three cities now combined in Greater New York. Other States show equally bad conditions. Legislatures have constantly interfered to the extent of abolishing or creating offices, altering salaries, ordering streets to be paved, forcing the city to pay claims which were groundless, compelling the construction of unnecessary buildings, etc. The evils of State interference are important. Responsibility cannot be fixed; or if it is traced to the State legislature, this body cannot be reached, for only a small proportion of its members is elected in the city concerned. Indifference is encouraged, and city affairs are left to those who make profit from governmental prerogatives. Due consideration cannot be given to local matters, and State legislators are not sufficiently acquainted with the needs of localities, other than their own, to act intelligently. Questions are decided by log-rolling and personal favor, or a city's interests are made the football of State politics. No continuity is possible in municipal policy. The State, too, suffers, for matters of general interest often are sidetracked to let pass some little bill in which a constituent of Senator —— is personally (and often financially) interested. These injurious effects have been recognized for many years, and various remedies have been tried or suggested. The one most frequently adopted is the enactment of constitutional provisions prohibiting special legislation upon municipal matters. This method by itself has not been effective, for the courts have so interpreted "special legislation" and "municipal matters" that State interference has often continued uninterrupted. (*Vide* court decisions in Ohio prior to 1902.) The difficulty has been that each locality has peculiar needs and that no charter which goes into great detail will suit all cities; neither will it continue to be satisfactory without amendment for any length of time. Further, the State must have some sort of control over local governments; they cannot be permitted to become wholly independent; the State must supervise all matters other than those of mere local interest. But the field of local affairs has not clearly been delimited, and as long as this is the case there must be confusion and bad administration.

Administrative Control.— The best results have been attained where there is a general act of incorporation for all cities (or all cities of the same general size), or if there be a charter for each city, where it is general in character, the minor details being left to the city to determine, and to be altered locally as conditions change. There should be central *administrative* supervision instead of legislative interference, and although great progress has not been made in this direction in the United States, it has been tried sufficiently to show clearly that it would be as successful here as it has been in Europe. Such a system would improve the character of our laws by enabling legislators to give more attention to State matters, would fix responsibility for inefficiency, would arouse interest in local affairs by placing the fate of the city in its own hands, would tend to separate State from local politics and leave each to be settled upon its own merits, and would refer administrative questions to administrative departments with their staff of experts and abundant experience whereby to reach a wise decision. Just where the line is to be drawn between local and

State matters is a difficult problem, and there is a strong tendency toward the centralization of certain functions, such as education and poor relief. But so far as these matters have been transferred to the State with beneficial results, it has been where there is no important local benefit, where there is not a great diversity of opinion among localities, where there is unity as to the methods to be adopted, and where the function is general and not limited to a few localities. Until these stages are reached, the State should control, but not administer, and the extent of this control should vary with the State's interest. In no case is it pardonable for the State regularly to appoint local officers. If the function is a local function and if the expense is borne locally, the State should not interfere, except possibly to remove an officer who has been proved to be guilty of malfeasance, or to appoint when a locality refuses to perform the duties imposed by the State. The trouble has been that the municipality is an agent of the State and also the means of satisfying local needs. Hence, it is necessary to determine whether a function is local or State, or partly local and partly State, and to frame the proper system of supervision or control accordingly. This brings us to a consideration of the scope of municipal activity as recognized by practice.

Municipal Functions.— From the legal standpoint, the municipality in Great Britain and America can do only what it is authorized to do by the central government, and grants of powers are strictly construed. In Prussia and France, and quite generally upon the continent of Europe, the municipalities have residuary powers. In law the difference is not so great as one might expect from the divergence in theory, and when comparison is made between actual operations, instead of the powers which *may* be exercised, England and Germany stand side by side. In these two countries, the local governments have a greater range of activities than in ony other countries in the world. Beginning with the protection of life and property, the function most generally performed by municipal governments, it is found that in all progressive countries, there are well equipped police, fire, health and judicial departments. These are not universally under the complete control of the municipal authorities, for in some cities, generally national capitals (for example, London, Paris, Berlin, and Vienna), the police force is wholly administered by the central government. In several American cities (for example, St. Louis, Baltimore, and Boston), the police authorities are appointed by the State. In practically all countries except the United States, the central governments supervise local police administration on the ground that the preservation of life and property is not of mere local interest but concerns the whole country. The same is true of the local judiciary, and to a less extent of fire and health, State supervision in the latter cases being much less extensive than in police and judicial administration.

The care of the dependent and delinquent classes is a recognized governmental function in all progressive countries, but the extent of municipal activity varies greatly. In Great Britain, the poor-law authorities are entirely independent of the town governments. Generally in the United States, especially in the smaller cities, poor-relief is granted by the county authorities, and subsidies to private institutions are made by most of the large cities. In France, Germany and the other principal countries of Europe, the cities generally have control, subject to supervision by the central governments. Everywhere municipal activity is supplemented by private and ecclesiastical charity, especially in the case of homes for dependent children and hospitals. German cities show the greatest amount of municipal action in this direction and English cities the least. The insane, owing to the comparatively small number in each locality and the economy of large asylums, are generally cared for by other than municipal authorities — State, department, or provincial authorities, as the case may be. For persons who are near the border line between dependence and self-support, there are many instances of municipal lodging-houses, either free or charging a small fee, and labor bureaus to provide employment for the unemployed. These are far more common in Europe than in the United States. A few cities have gone so far as to establish schemes for employment insurance and to rent land in small allotments to the poorer classes for truck farms.

Educational facilities are also generally under municipal control, but central supervision is usually more thorough and far-reaching than in the case of charity administration. Since the recent act in England abolishing the school boards was passed, elementary education almost everywhere is a municipal function. Secondary education is more generally left to private or church management, except in the United States where it has been municipalized, or in Germany where it belongs frequently to higher governmental authorities. As one goes higher and higher in educational work, the activity of city governments decreases. In recent years, the broadening conception of education has introduced trade schools, but there are few of these under municipal control in the United States, while in Europe they are very common, although in the smaller countries particularly, the central government often contributes to their support. Public libraries are more common in America than elsewhere. In Europe there are fewer private donations. The public treasury bears most of the burden, and there is hardly a town of importance that does not have a municipal library. On the Continent they are mostly scholars' libraries which are not frequented by the general public, as is so generally the case in the United States. Municipal museums of art and science are more common in Europe and are visited by large numbers. Theatres and opera houses are also frequently maintained by foreign cities, but of course they are not free like museums and libraries. The prices charged, however, are often very low. American cities sometimes provide concerts for the public in the parks, but there is no instance to my knowledge of a municipal theatre or opera house in the United States.

In the matter of parks, American cities, as a rule, excel all others, but Paris is the most favored city of all. Including the large parks of Versailles and Fountainebleau, there are nearly 200,000 acres within a short distance of the city, and 20,000 acres can be reached in an afternoon excursion. In foreign cities, one

more frequently finds parks under private or national control than in the United States, and this is particularly true of botanical and zoological gardens, which are parks in many ways. The movement for small parks and playgrounds in densely populated districts is growing rapidly. German cities lead, but American and British cities have been more active in recent years. Municipalities have also provided facilities for football, baseball, polo, ice skating, tennis, horse racing, cricket, bicycling, bowling, target shooting, lacrosse, dancing, bull fighting and the many other forms of amusement peculiar to each country. There are also instances of recreation piers, music pavilions, school gymnasiums, race tracks, etc., administered by cities. Public baths — plunge, spray, shower, tub and sometimes Russian, Turkish and medicinal as well as river and harbor baths — have been maintained by municipalities for decades, but the great increase has come within the last 20 years. Great Britain and Germany head the list, the United States consorting with Russia, Italy, and Austria at the foot. It is to be recalled, however, that the need, great as it is, for public baths in the United States, is relatively less than in Europe where so few bath-rooms are to be found in private houses and apartments. The first municipal indoor bath in New York city was opened about two years ago.

Other instances of the democratization of city governments are to be seen in the reconstruction of slum districts, the condemnation of old rookeries, the laying out of new streets and the rebuilding of the remaining areas. Here again European cities have gone farthest. The gigantic schemes undertaken by Glasgow, Birmingham, London, and Paris show what excellent results can be accomplished, and in many instances the increased value of the land has paid a large portion (in a few cases, all) of the cost of the scheme. American cities, because of their limited powers in this regard, have not been able to carry out such large schemes or finance them so successfully. Usually a portion of the expense of laying out new streets or widening old ones is assessed upon the property benefited, and the city is recouped in part. The care of bridges and streets — paving, cleaning and repairing — is almost everywhere a municipal function, and tolls are rapidly being abolished on bridges as they disappeared from roads earlier. Sewerage systems, which have come to be considered indispensable in progressive American towns, are not so common in Europe, especially outside of the large cities, and a number of these (St. Petersburg and Moscow, for example), do not have anything that approaches a system. Conditions in the smaller cities and in the less progressive countries are most primitive. Garbage and refuse disposal is still less a municipal function, but as in the case of sewage, no progressive city of any size is considered up-to-date which does not do something either directly or indirectly. Many cities do not undertake to perform the work by direct labor, but let the contract to a private corporation. The tendency, however, is toward day labor rather than the contract system.

Industrial Functions.— The functions over which there is most debate as to the propriety of municipal action, are those which may be termed industrial functions, that is, those in which the municipality acts less as a governmental and more as a private corporation. The oldest instance is the ownership of real estate. Many of the European cities own large estates (Berlin possesses nearly 40 square miles and Vienna receives upward of $2,000,000 annually), and in some instances the income constitutes a large proportion of the total revenue — 40, 50 or 60 per cent. American cities have squandered their patrimony and now own little. New York city owned 1,500 acres on Manhattan Island as late as 1844, but soon sold it for little. Markets, cemeteries and abattoirs are usually under municipal control in Europe and not infrequently in the United States. The object is not so much profit as the protection of the health and well-being of the city. For the same reason waterworks have been operated by municipalities for generations, and the number is constantly on the increase. Municipal operation is almost universal in Germany, and exists probably in fully one half of the cities of France which have plants. In Great Britain and the United States, about two thirds of the cities over 10,000 population have municipal systems, and the supply is better and more abundant than in other countries. The municipalization of lighting plants has not been carried so far. It is advocated on economic grounds and for reasons of political expediency rather than because of the direct effect upon the health and well-being of a community. Here again Germany leads, municipal gas plants existing in four fifths of the larger towns. Great Britain is a close second; one half of the cities over 50,000 and over one third of all the towns having gasworks at all operate their own plants. In other countries private operation holds sway, although there are many instances of municipal operation. The United States has only 20 municipal plants, and in a few other instances they are jointly owned or there are also private companies.

Electric lighting is a later development than gas, and the greater extent of municipal operation reflects the strong tendency in this direction. Towns have often been able to build their own plants without buying out a private company at exorbitant prices, which was frequently necessary in the case of gas lighting, where grants were made to private companies before municipal operation was generally considered as a wise course to pursue. Municipal operation is most common in Great Britain, where only one third of the undertakings are in private hands. In Prussia about one half of the more important cities have municipal plants. Outside of Germany there are many municipal plants scattered throughout Europe, but the number of private companies is very much larger. There are many in the United States also, the number being 278 in 1902, but in nearly one third of these places there were also private companies. The proportion is larger among small towns, where electricity has only recently been introduced, than among the large cities.

The municipalization of transportation facilities, other than streets and bridges, is a still more recent movement. Harbor improvements, docks and quays are quite commonly under municipal administration, but sometimes the central government has jurisdiction. There are a few instances of municipal ferries. Street railways have also been municipalized, there being

instances of municipal ownership without municipal operation and also complete municipal management. The former was the earlier form and until recently was generally adopted by British cities, but now it is giving way to public operation, and the mileage of municipal undertakings considerably exceeds that belonging to companies. In other countries municipalization has not gone so far, the number of instances being small but on the increase. Nearly every country has a few instances of public ownership or operation, except the United States, where there is only one of little importance in Grand Junction, Colo. Two American cities, New York and Boston, own rapid transit subways, and their example will probably be followed in other directions.

Another important function in central and western Europe is the municipal pawn shop (see MONT DE PIÉTE) in nearly all of the larger and many of the smaller cities, except in Great Britain, where no steps have yet been taken in this direction. In the United States, it is also left to private action, subject to regulation through laws and ordinances. Municipal savings banks are a natural outgrowth of municipal pawn shops. They are very numerous in Germany, where there are no postal savings banks, probably aggregating 1,500 in number. In France, Austria and Italy they are almost as numerous, but are more scattered in the other continental countries. Great Britain and the United States have none. A number of Russian cities have commercial banks, receiving deposits, giving credit, and in other ways doing a genuine banking business. This course has not been followed elsewhere so far as I can learn.

There are sporadic instances of other functions performed by city governments. Many cities virtually insure their own buildings by refusing to take out policies in private companies, but a few have gone further and have insured the property belonging to private individuals. Many English towns maintain laundries where the poor may bring their clothes, wash, iron and dry them for a small fee. Municipal telephones are becoming common in Europe. Tenements and single houses have been erected by many British towns for the working classes, replacing unsanitary dwellings. Certain cities manage restaurants, own interurban steam railroads, irrigation systems, stone quarries, brick yards, cold storage warehouses, oyster beds, fisheries, printing plants, lotteries, newspapers, undertaking establishments, etc.

Trend of Municipal Activity:— If one were to compare present with past municipal activity, he would find that great changes have been made. Certain functions have been lopped off and many new ones added. International affairs, for example, are now administered by the central governments; the prevention of fires is no longer an individual matter but dealt with collectively through city administrations. Upon the whole, there has been a great increase, for the new functions are far more numerous and comprehensive than those which have ceased to be municipal. The general trend is toward (1) the transfer to other authorities of functions of general as distinguished from local interest, which tend to increase as the country becomes more thickly settled; (2) the centralization of matters in the administration of which uniformity is possible and essential, and economy by consolidation important; (3) the multiplication of regulations dealing with the relations of man to man, because the individual cannot protect himself and because he should not be allowed either to impose upon the less fortunate or to remedy any injustice in his own way; (4) the increase of constructive action as distinguished from repressive measures, which is made possible by the concentration of population and has become necessary because of the conditions which great density has produced; (5) the taking over from private hands of functions which have become monopolistic and yet are of such vital concern to the whole city as to demand collective rather than individual management. In no country has there developed a fixed rule for determining whether a function should be undertaken by the municipality. None is feasible, for local conditions must decide, and these vary so greatly that it is folly to insist that municipalities shall or shall not adopt a certain course, because it apparently conflicts with some *à priori* definition of "natural rights" or a preconceived idea of the proper sphere of government.

Governmental Organization.— Having considered what is the position of the city in law and practice, its governmental organization demands attention. As in all governments, provision is made for expression of the popular will and the execution of its edicts. In practice an official may have something to do with each, and this often leads to confusion and misgovernment, for where the choice of an administrative officer is determined by his personal opinion upon matters which do not come directly under his jurisdiction, the results cannot but be disastrous. Yet, such will be the case as long as the sphere of the city is not clearly delimited and there is no adequate means for the enactment of laws which represent the will of the city, as is the case in most American cities at the present time. The first steps in the expression of the popular will are the organization of parties, the making of nominations and the election of officials. These subjects are discussed elsewhere and need not be elaborated here, except to note that the conditions of city life make necessary the adoption of methods in urban different from those in rural districts, as for example, personal registration in cities and proxy registration in the country.

The Council.— The number and character of offices to be filled are also quite different in cities. There is always a local legislative body of some sort, except in a few instances where the city is administered by higher authorities, as in Washington, D. C., where the citizens do not vote at all. These legislative bodies vary greatly in every respect. In some cities, there are two chambers; in others, only one. The consensus of opinion in Europe favors a unicameral council. There are not many truly bicameral legislatures, and where two bodies do exist, it usually will be found that one is more of a consulting body for the administrative officials than a legislature. A number of American cities have two bodies, but experience does not approve the plan. New York city has a board of estimate and apportionment and a board of aldermen, but the latter has proved so unsatisfac-

tory that its powers have been reduced until it is only the shadow of its former self.

This tendency is almost universal in the United States, and what functions the State legislature has not assumed have frequently been transferred to the administrative departments and to the mayor, who has come to be the central figure. There are exceptions, however, and the city which most nearly resembles foreign cities with their important local legislatures is Chicago, where the council is unicameral and possessed of considerable power, even in administration as well as legislation. It is suggestive to note that Chicago has probably escaped with as little special legislation as any city and that it is organized under a general State law, which is a simple, brief, condensed statement of municipal organization and powers. Where there is a council of any importance, by whatever name it may be called, it usually is empowered, subject to such statutory limitations as exist, to regulate its own organization and procedure, to enact local ordinances, to issue franchises, to control the public property, to levy taxes, to borrow money, to apportion expenditures, and less generally to appoint and remove the chief administrative officials (council committees in England), to act as a judicial body, and ex-officio to perform many minor duties. The number of members of the council varies greatly, European bodies being generally larger than American. The London County Council has 137 members, the Budapest Council 400, the New York Board of Estimate and Apportionment only 8, Chicago 70. The term of office ranges generally from one to four years, but in certain instances as high as six and nine years (not in United States). In some countries, the whole council retires at once; in others only one half, one third or one fifth go out at the same time. Where the council committees have close oversight over administrative functions, some continuity is very essential. Of course, it often happens, especially in European countries, but not infrequently in the United States, that an efficient councillor is re-elected for several times — a custom that produces very beneficial results. The systems of representation are also various. America, England, and Germany have followed the district plan, each ward electing not more than one member at a time. In other continental countries, the council is elected on a general ticket, or each district elects a considerable number of members. Minority or proportional representation is often provided for under the general ticket plan, either by cumulative or limited voting. In Prussia, Austria, Japan and some other countries, the voters are divided into three classes, the total of the taxes paid by the voters in each class being one third of the total amount collected. Each class elects one third of the municipal council, from which it is evident that the large taxpayers have a much greater influence than the small taxpayers. The qualifications for members of the council are generally less stringent in the United States than those of voters, for an alderman need not live in the district from which he is elected, although in practice, it is seldom that he does not. In foreign countries and in a number of American cities, they are more stringent, the holding of property or the payment of a tax being a prerequisite. Obligatory unpaid service is common abroad, but some sort of a salary, although as low as $1 per session, is usually paid in American cities, and compulsory service has ceased to obtain.

The Mayor.— In the United States both legislative and administrative functions are possessed by the mayor. He very frequently, although not universally, has the veto power and sometimes presides over the council and appoints the committees. His principal powers are executive, however, and as the head of the administrative service he exercises powers that make him by far the most important person in the city government. He usually appoints and frequently may remove at will the principal officials, except the few that are elected, and consequently determines to a great extent what their policies shall be. The tendency is toward an increase of these powers; in fact, that has been the trend since the first of the 19th century. As the council has declined, the mayor has grown stronger. The method of selection, with a few exceptions, is by popular vote. Salaries range from $15,000 in New York down to small amounts in the less important cities. There are very few over $5,000 per year. Terms of office vary from one to five years, the usual length being two years in the larger cities, with one year becoming more common as the size of the city decreases. In practice, a re-election is not uncommon, but it is rarely that a man serves more than two terms.

The situation is entirely different in England. The office of mayor is one of honor and dignity but possessed of few powers. He is a member and presiding officer of the council, but has no veto power and appoints no officials except when he happens to be a member of a committee, but even then he has no more power than any other member. He is appointed by the council annually and very frequently does not succeed himself. His heavy expenses for social functions are only partially reimbursed by appropriations voted for this purpose, and hence only well-to-do men can afford to accept the honor. The one official who most nearly resembles the American mayor is the town clerk, but he is appointed by the council, receives a large salary (for England), has a permanent tenure, and does not appoint the administrative officials. Whatever of unity and harmony there is he produces, and it is his duty to keep in touch with everything. But the real administrative work of the departments is conducted by superintendents selected and directed by the committees of the council, among whom the activities of the city have been apportioned. These committees must, of course, do as commanded by the whole council, but they have great freedom and they are the administrative heads of the city, as well as part and parcel of the legislative body. It is evident that the English system contains no official who can be compared with the mayor in the United States.

In France, the *maire* more nearly resembles his American contemporary. He is a member of the council and its presiding officer, but has no veto. He prepares the provisional budget and has full power over the administration. He appoints most of the salaried officials, and may remove them. He controls the property of the city, directs public works, supervises expenditures, etc. As agent of the central government

he has charge of the police and oversees the faithful execution of the national laws. He is elected, as in England, by the council, but is responsible to the central government rather than to the city. His term of office is four years.

The Prussian *bürgermeister* is not a member of the elective council, but of the board of magistrates — a sort of executive council which initiates legislation and perfects local ordinances. He does not directly appoint the other administrative officials, but he has considerable influence in this direction, being the head of the board of magistrates, which directs and controls all departments. Tenure of office is very long; the appointment is ordinarily for 12 years and sometimes for life. Burgomasters have professional training for administration, a life occupation, and are well paid considering the salaries usually given in Germany. Promotions from a small to a larger city are common.

Administrative Departments.— From this brief outline it is evident that the administrative service in France and the United States generally, is under a single head — the mayor; in Germany, under a special body — the magistrates; and in England, under the council committees. All are elected or appointed by the council and hence more or less subject to its control, except the American mayor who is elected by the people and hence wholly independent. In the United States certain of the department heads are commonly elected, such as the board of education, comptroller and treasurer (finance), assessors and sometimes others. In some cities, the council elects a considerable number; in others the appointments of the mayor must be confirmed by the council; but the trend is toward few elective officers and unrestricted power in the hands of the mayor of appointment and removal. Foreign experience points in the same direction, for the French *maire*, the English council committees and the Prussian magistrates appoint without confirmation of the council. The power of removal is not much considered abroad, for the salaried officials are experts and hold office continuously. The number of departments and the allotment of functions vary greatly from city to city. In Europe these matters are generally left to the convenience of each town; in the United States the charter often fixes them arbitrarily. The relative merits of a single head or a board of commissioners have long been discussed. The drift in the United States is toward a single head, although schools, parks, police and public works are still generally managed by boards. In England the board system is practically universal, but the council committees usually leave to the salaried and permanent head all questions save those of general policy — a very wise course. In Germany the joint committees of councilmen and magistrates are mainly advisory bodies, much more so than the committees in England. In France the single commission system is universal. Thus, the United States is the only country that clings to boards of salaried administrative officials as department heads, and here they are on the wane. Subordinate officials are invariably appointed by the heads of the departments, who have much more discretion in Europe than America where civil service rules are being widely introduced and extended. In New York city, for example, all of the city positions are included in the classified service, except the most important, those of a confidential or fiduciary character, and those requiring only manual labor. Even the last named are subject to certain examinations. In England, no such system exists in the municipal service. The spoils idea has not gotten a foothold, and it has not been necessary, therefore, to tie the hands of city officials with civil service rules. German and French cities have competitive examinations, but these are merely means to sift out the unfit, to ascertain the half dozen or dozen applicants best fitted for the position. Considerable freedom is permitted in the final choice. The public opposition to spoils is a far greater restraining force than civil service regulations.

The Municipal Problem.— Much as Americans dislike to admit it, there is no escape from the fact that European cities generally are better governed than those in the United States; there is greater efficiency, and much less dishonesty and corruption abroad. This is so well recognized that we have a distinct "municipal problem," peculiar to American cities and unknown beyond the Atlantic, having a voluminous literature of its own. In a word, the problem is: How may honesty and efficiency be secured and retained in municipal affairs? The solutions that have been suggested are many. In the first place, governmental organization has been criticized, and it has been urged that new charters should be secured. This has seemed so reasonable that charter tinkering has been the favorite occupation of the reformers in every city, but no deep and far-reaching regeneration has followed. Every known system has been tried, without achieving the desired result. Doubtless the best system helps to secure honesty and efficiency, and the highest results cannot be attained without it, but it is not the most important element. The cities with the best charters have not been the best governed. Another factor, which has been noted by many, is State interference in local matters. This has contributed to the difficulty of the situation undoubtedly, and there is the experience of England to prove that when local affairs are left to the municipality to administer and State affairs to the central government, the efficiency of each is greatly increased. But the few American cities that have been free from State interference are not so much better than the rest as to show that here is the solution of the problem. The foreign elements in our populations have also come in for a share of the blame. It is pointed out that whereas in many American cities the proportion of foreign born persons ranges from 30 to 40 per cent, in foreign cities the number of persons born outside of the country in which they reside very seldom exceeds 5 per cent and usually ranges from 2 to 4 per cent. The fact that the foreigners who throng our cities are ignorant of our institutions and unfitted for the duties of citizenship in a democracy is made the basis for an appeal for restricted suffrage and immigration as a means of purifying politics. But if this is the fundamental difficulty, why is it that those cities where the people are almost wholly of Anglo-Saxon descent, are as badly governed as any? It must be admitted, however, that the mixture of races with conflicting ideas upon

all questions makes it almost impossible to bring them to agree upon the issue in an election and to get an expression of opinion upon one issue. To tell what is the result of an election under such conditions is impossible. The policy of imposing upon a city a statute which is directly contrary to the will of the people adds to the confusion and forces the voters to consider the iniquity of such measures and to disregard the question of municipal honesty and efficiency, often apparently opposing an administration which gives them both efficiency and honesty. There are still other students of municipal government who urge proportional representation, direct legislation, ballot reform, nominations by the people, the organization of *local* political parties, or restriction of suffrage to taxpayers, etc., as the principal means of reform. Of late public operation of municipal monopolies has received much attention, and when one considers the great amount of corruption due to bribery of city officials connected with the granting of franchises, he is almost forced to the conclusion that municipalization would be preferable, even with all the "graft" which might follow.

Admitting that all these factors may contribute something and that no one contributes all, is it probable that together they furnish the explanation and point the way to relief? Is there no other important factor? I cannot but believe that the fundamental difficulty lies deeper. It is very suggestive to note that the epochs of high tide in municipal corruption almost invariably and with exactness coincide with the periods of greatest dishonesty and swindling in private finance. The lid has recently been taken off of business and politics, and the stench arising from each has been equally nauseating. In the period of gigantic corruption in business, following the Civil War, honesty seemed a lost virtue in many quarters. This was coincident with the reign of the Tweed Ring in New York, the Gas Ring in Philadelphia, etc. And if other illustrations are needed, continue the excursion prior to the Civil War; the same coincidence will appear. It is foolishness to expect that men have one conscience for business and another for politics, which are put on and off as occasion requires. The same standards and the same practices, if analyzed carefully, will be found to obtain in business and in politics. Reformers have urged that municipal administration is business not government and should be conducted as business. That is exactly the position of the corruptionist. Municipal administration *is* business; it has been business; it is conducted upon the same principles as business; and as long as it is and as long as business is corrupt, government will be corrupt. What are wanted are a regenerated civic consciousness, higher standards of honesty and morality, and genuine personal integrity. Other factors will aid in the realization of the ideal city, but cannot go far and any advance will be only transitory, unless individual standards are improved.

For references to the literature upon municipal affairs, see Brooks' 'Bibliography on Municipal Problems and City Conditions,' published by the Reform Club, New York. See also the following topics in this encyclopædia: CHARITIES, CIVIL SERVICE, EDUCATION, ELECTIONS, FINANCE, GARBAGE DISPOSAL, LIGHTING, MUNICIPAL OWNERSHIP, MUNICIPAL ACCOUNTING, PROPORTIONAL REPRESENTATION, SANITATION, SEWAGE DISPOSAL, AMERICAN STREET RAILWAYS, WATER SUPPLY, TENEMENT HOUSE REFORM.

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Municipal Housing. See TENEMENT HOUSE REFORM.

Municipal League, National. See MUNICIPAL ACCOUNTING.

Municipal Ownership, a term which in its broadest sense might be applied to a city's owning any business, but which in general usage is referred merely to the city's ownership of such public utilities as are natural monopolies. Natural monopolies have been defined as those industries which from some inherent quality inevitably tend to become monopolies; the most important of such industries in municipalities are waterworks, lighting plants, and street-railways. The question of public ownership of these utilities is a recent one, and is the result of the rapid growth of cities, and the increasing need of having water, light and transportation, supplied with efficiency and cheapness to all citizens.

Arguments For and Against Municipal Ownership.—The reasons advanced in favor of municipal ownership are as follows: (1) An increase of the city government's functions is desirable because it makes the public affairs of more importance to the individual citizen, so that he gives them more time and attention and the government of the city does not fall into the hands of a few; also because increased importance and dignity of public services will attract better and more efficient men to the service. (2) The large monopolies which own public franchises are the principal cause of corruption in municipal government, through their attempts to gain and keep franchises, and enlarge their privileges without regard to the public welfare, and to give their functions and privileges to the municipality direct would remove a corrupting influence. (3) A city can float bonds at a lower rate of interest than a private company, and can lower the cost of supply by not seeking to make large profits on watered stock, but by merely paying expenses and interest on bonds. (4) If profit beyond this be made it can be used for lowering the general tax rate, or rates to private consumers can be reduced. (5) Without too greatly increasing costs the city may afford to pay higher wages for shorter hours to employees, and improve the standard of the condition of labor. The argument is further advanced that in the great majority of cases in which municipal ownership has been tried, the results have been very favorable, and that the cases of municipal mismanagement are more than matched by the cases of mismanagement of private industries. Among the most notable and successful examples of municipal ownership is that of the street-railways in Glasgow, Scotland, where the city assumed the operation of all street-railway lines in 1894; in that year the fares were reduced, the mileage was rapidly extended and electricity was substituted for horse-power; the financial success of the city's enterprise is thus briefly summed up in the 1902 report of the department: receipts, $3,052,000; expenses, including allowance for

deterioration, $2,015,000; balance, $1,037,000, half of which is credited to the general reserve fund. Another set of statistics indicating advantage in municipal ownership, relate to the gas-plants owned by cities in the United States. In 1901 the average price of gas in private enterprises was $1.04 per 1,000 feet, in public plants $0.92 per 1,000 feet, the public plants having less than half as great an average output; in the same year the public plants made a gross profit of 29.9 cents per 1,000 feet, showing that cheaper rates did not involve failure to meet expenses. The reasons advanced against municipal ownership are as follows: (1) The political corruption of American city governments would involve inefficient officers appointed for political reasons, and consequent mismanagement. (2) If city officials are dishonest in their dealings with corporations, there is no reason to suppose they would be more honorable in their management of public industries and funds. (3) In the desire of the officials to win popular favor, rates to consumers may be reduced below what the city can really afford, and the industry thus made a public burden; or (4) a mistake on the other side may be made with the idea of reducing the general tax rate, and those who are consumers be really taxed for the benefit of those who are not. (5) Municipal management will not be progressive in testing new methods and developing new territory, being fearful of running the risk of failure and heavy expenses which such experiments involve. Opponents of municipal ownership also argue that the cheapness claimed for city operation of industries is more apparent than real; in proof of which they call attention to the fact that in many cities which have undertaken the management of municipal enterprises no provision is made in the accounts for deterioration and wear and tear of machinery and plant, or if such provision is made it is not equal to what many experts have declared sufficient, and that this item of expense will ultimately become a burden to the community. They also cite the case of the gas works of Philadelphia (the largest American city to own its gas plant) where public operation was inefficient and expensive, and a return was made to private management; and claim that this might occur in any city, especially in any large city.

Statistics of Municipal Ownership.— The first publicly owned waterworks in the United States were those of Winchester, Va., built "before 1800"; in 1890, 42.9 per cent of all waterworks in the United States were under municipal ownership; in 1902, 51 per cent were under municipal ownership; in larger cities of over 30,000 inhabitants 88 out of 135 plants were owned by the city; and the proportion of privately owned plants was largest in cities of 5,000 to 30,000 inhabitants. In 1900, of 981 cities of the United States reporting, 21 owned their gas plants (this including Philadelphia, whose plant is leased to a private company till 1927); no city larger than Philadelphia had attempted public ownership; the larger cities with public gas plants are Richmond, Va., Wheeling, W. Va., and Duluth, Wis. In Germany, however, 41 out of 54 of the larger cities own their gas plants, and the smaller cities show a still larger proportion of municipal ownership; municipal plants are also common in Holland, Sweden and Switzerland. Electric lighting plants have come somewhat more generally under municipal ownership in the United States, but few large cities have entered this field; in 1900, out of 135 cities of over 30,000 population only four owned their electric plants; but the proportion is much larger in the smaller cities and towns; of 579 cities of from 3,000 to 5,000 population, 111 reported public ownership of electric lighting plant, and 18 joint ownership. The public ownership of street-railways has made no advance in the United States; in Great Britain many large cities have gained control of their street-railways; prominent among them are Glasgow, Plymouth, Blackpool, Liverpool, Sheffield, Hull, Southampton, Huddersfield and Belfast. On the Continent municipal ownership of street-railways is rare, but increasing. Only one city of the United States owns its street-railways, Grand Junction, Col.; the cable road across Brooklyn Bridge was at one time owned and operated by the city, but was later given over to private management. New York city owns its docks, other cities have municipal boards which have supervision and control of docks, though privately owned, and Boston and a few other cities own the ferries. The question of municipal ownership of local telephone lines has also been considered, and a few municipal telephones are found in Great Britain.

It should be remembered, however, that the total progress of municipal ownership cannot be measured entirely by the proportion of cities owning important industries. Advance has been made along other lines, as for instance the increase of general and special State legislation authorizing the erection and purchase of waterworks and lighting plants, and providing for extra taxation or bond issues for establishing municipal plants; in the cities, too, there has been a growing tendency to limit the franchises in regard to time, with the idea of making municipal ownership possible in the near future. Many public men are giving serious consideration to the subject and the mayors of several important cities have been elected on a municipal ownership platform, or have openly favored it, among them may be mentioned the mayors (in 1902) of Toledo, Denver, Cleveland, and Columbus; in the election of 1901, in Saint Louis both parties had a plank favoring municipal ownership. In Chicago, an attempt to extend the franchise of street-railways for 50 years was defeated; and the question of municipal ownership of gas and electric plants, and street-railways referred to the people in the aldermanic election of 1902; the result of the vote is interesting as showing the state of public opinion in one of our largest American cities:— of the 213,859 votes cast

{ 170,824 favored city ownership of street railways.
{ 161,365 favored city ownership of gas plant.
{ 157,740 favored city ownership of electric light plant.

Consult: Bemis, 'Municipal Monopolies' (1899); Carey, 'Municipal Ownership of Natural Monopolies' (1900); Fairlie, 'Municipal Administration' (1901); Foote, 'Municipal Public Service Industries;' Francisco, 'Municipalities vs. Private Corporations' (1900); Goodnow, 'Municipal Problems'; Whinery, 'Municipal Public Works'; United States Commissioner of Labor, 'Water, Gas and Electric Light Plants under Private and Municipal Ownership' (1899); and 'Municipal Affairs,' winter number for 1902.

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Munjistin, an orange coloring matter, closely allied to purpurin and to alizarin, which occurs in munjeet (East Indian madder), and has the formula $C_{14}H_5(OH)_2O_2.COOH$. It dissolves in boiling alcohol, separating again, upon cooling, in the form of brilliant golden plates. Munjistin gives an orange yellow color when used as a dye with aluminum mordants, and with iron mordants it gives a brownish purple, its colors being fairly permanent.

Munkacsy, moon'kä-chē, **Michael,** Hungarian painter: b. Munkacs, Bereg County, Hungary, 10 Oct. 1846; d. Endenich, near Bonn, 1 May 1900. His real name was Lieb, but he is known only under the assumed name derived from that of his birthplace. Beginning life as a carpenter, he met a strolling portrait painter in Gyula, who was so much struck by the artisan's interest in art that he gave him painting lessons. Munkacsy proceeded to paint portraits and genre pictures, taking his subjects from common country life. One of these early canvases, 'A Country Idyll,' was purchased by the Art Union of Pesth. He eventually put himself under the instruction of the battle-painter Franz Adam at Munich. He made rapid progress and the Hungarian government awarded him the first prize for genre paintings thrice in succession, and he was thus enabled to take up his residence at Düsseldorf and to study under Knaus and Vautier. The first great picture he painted was 'The Last Day of a Condemned Man,' exhibited in the Paris Salon in 1870. This was followed in 1871 by 'Wartime' (an episode in the Hungarian war). The succeeding year he made Paris his home and his pictures began to attract growing attention. He painted many small genres of singular power and character, such as 'Going to School'; 'The Kitchen Politician'; 'The Butter Woman'; 'The Pawn Shop' (1874); 'The Workshop' (1875); but as his strength and mastery of his art grew he rose to loftier subjects, religious and historical. In 1877 he painted 'Milton in his Blindness Dictating Paradise Lost,' to which was awarded the gold medal at the Paris Exposition. It is now in the Lenox Library, New York. Great as was the sensation created by this picture, a historic genre of remarkable coloring in gray and black and of profound insight and power of characterization, an even deeper impression was produced by his 'Christ Before Pilate' (1882), which some critics consider the greatest religious picture of its century. This vast canvas is startling in its freshness of conception, its living action, the mingled grandeur and pathos which the artist has infused into his treatment of the central figure, as well as its masterly composition and technique. It has been exhibited in all quarters of the civilized world and was bought by John Wanamaker of Philadelphia for $120,000. It was followed by his dramatic 'Christ on Calvary,' the religious intensity of which is heightened by the accurate fidelity to differing national types with which the spectators of the Crucifixion are portrayed; a piece of realism whose suggestiveness is obvious. In 1886, he produced 'The Last Moments of Mozart,' now in the collection of General Russell Alger, Detroit, Mich. The present owner paid $50,000 for this pathetic picture, in which the composer is listening to his still uncompleted requiem, sung at his bedside by his favorite singers, the night before his death. The last three years of his life this painter suffered from mental alienation and closed his days in a sanitarium.

Mun'kar. See MOHAMMEDANISM.

Munkit'trick, Richard Kendall, American author and editor: b. Manchester, England, 5 March 1853. He was educated in American academies and was one of the editors of the humorous journal 'Puck' 1881–9. Since 1901 he has been editor of 'Judge.' He has published 'Farming' (1891); 'The Moon Prince and Other Nabobs' (1893); 'New Jersey Arabian Nights' (1893); 'The Acrobatic Muse' (1896); 'The Slambangaree' (1898).

Munn, Charles Clark, American novelist: b. Southington, Conn., 1848. His boyhood was spent on a farm which he left at 17 and for 30 years was engaged as a commercial traveler. He is the author of several popular novels, including: 'Pocket Island' (1900); 'Uncle Terry: a Story of the Maine Coast' (1900); 'Rockhaven' (1902).

Munn, Orson Desaix, American publisher: b. Monson, Hampden County, Mass., 11 June 1824. He was educated at the academy in Monson, was a clerk and country store-keeper there until 1846, and then bought the 'Scientific American,' which he has published since that date. He is also head of Munn & Company, patent solicitors.

Muñoz, Juan Bautista, hoo-ān' bä-oo-tēs'-tä mū-ñōth', Spanish historian: b. near Valencia, Spain, 1745; d. Madrid, Spain, 1799. He was graduated from the University of Valencia and was appointed in 1779 historiographer of the Indies and was instructed by the king to write a history of America. This work was published under the title 'Historia del Nuevo Mundo' in 1793 and though completed only to 1500 is highly valued. Of his manuscripts many are now in the Academy of History at Madrid but, unfortunately, many others are scattered.

Munro, mŭn-rō, **Neil,** Scottish novelist: b. Inveray, Scotland, 3 June 1864. He has published 'The Lost Pibroch: Celtic Tales and Sketches' (1896); 'John Splendid,' a Highland romance (1898); 'Gilian the Dreamer' (1899); 'Doom Castle' (1901); 'The Shoes of Fortune' (1901).

Munroe, mŭn-rō', **Charles Edward,** American chemist and expert on explosives: b. Cambridge, Mass., 24 May 1849. He was graduated at Harvard in 1871; was assistant in chemistry there for three years; professor of chemistry United States Naval Academy 1874–86; chemist to United States Naval Torpedo Station 1886–92; and since the last date professor of chemistry and dean of Columbian University, Washington, D. C. He was a special agent on chemical industries for the United States Census of 1900; is president of the American Chemical Society; received the decoration of the Order of the Medjidje from the Sultan of Turkey, 1901; has invented a smokeless powder; and is the author of various monographs on chemistry, notably of explosives.

Munroe, Charles Kirk, American writer for boys: b. Appleton, Wis., 15 Dec. 1856. He was educated at Harvard and was editor of 'Harper's Round Table' 1879–82. For many years

he has made Florida his home. Among his numerous works are: 'The Flamingo Feather' (1887); 'Wakulla' (1888); 'Campmates'; 'Canoemates'; 'Raftmates'; 'Rick Dale'; 'Dorymates'; 'The White Conquerors'; 'Big Cypress'; 'At War with Pontiac'; 'Life of Mrs. Stowe' (with her son); 'Copper Princess' (1898); 'Forward March' (1899); 'Under the Great Bear' (1900), etc.

Munroe, Robert, Scottish archæologist: b. Ross-shire 21 July 1835. He was educated at the University of Edinburgh and was a physician at Kilmarnock till 1886 when he turned his whole attention to archæological researches. He is a member of many learned societies at home and abroad and has published 'Ancient Scottish Lake Dwellings' (1882); 'The Lake Dwellings of Europe' (1890); 'Rambles and Studies in Bosnia, Herzegovina and Dalmatia' (1895); 'Prehistoric Problems' (1897); 'Prehistoric Scotland and its Place in European Civilization' (1899).

Mun'see Indians, an American tribe of the Delaware family, originally one of the three great divisions of that race. They were sometimes called the Wolf tribe of the Delawares. They resided along the Delaware River, and in New York, Pennsylvania, and New Jersey. During the Revolution many of the Munsees removed to Canada, where at Thames, Ontario, in 1903, there were about 100 survivors. At Green Bay, Wis., is another tribal remnant of several hundred. See DELAWARE INDIANS.

Mun'sell, Joel, American printer: b. Northfield, Mass., 14 April 1808; d. Albany, N. Y., 15 Jan. 1880. He established himself in Albany in 1827, and was publisher and editor of the 'New York State Mechanic' from 1841 to 1843. At various times he was the publisher of the 'Unionist,' the Albany *Daily State Register, Morning Express* and *Statesman,* and other journals. Munsell made a close study of the art of printing, in its history and application, and his collection of works on the subject, the largest in America, was in part purchased by the State for the New York State library. He contributed papers to the 'Transactions' of the Albany Institute, of which he was a founder, and published: 'Outlines of the History of Printing' (1839); 'Annals of Albany' (1849–59); 'Every-Day Book of History and Chronology' (1856); 'Chronology of Paper and Paper-Making' (1857, enlarged 1870); and 'Manual of the 1st Lutheran Church of Albany, 1670–1870' (1871).

Munsey, mŭn'sĭ or -zĭ, **Frank Andrew,** American publisher: b. Mercer, Maine, 21 Aug. 1854. After receiving a common school education, he began his business career in a country store, and then became manager of a telegraph office in Augusta, Maine. He went to New York in 1882 and started 'The Golden Argosy,' a juvenile weekly which he afterward changed into a monthly for adults under the style of 'The Argosy.' 'Munsey's Weekly' appeared in 1890, and after issuing this for one year he transformed it also into a monthly calling it 'Munsey's Magazine. He also founded 'The Junior Munsey' and 'The Puritan.' He might be said to be the pioneer in the publication of cheap illustrated publications. He also controls the New York *Daily News,* the Boston *Journal* and the Washington *Times.* He is a popular member of many clubs in New York city and elsewhere, and is the author of several books for boys: 'Afloat in a Great City' (1887); 'The Boy Broker' (1888); 'A Tragedy of Errors' (1889); 'Under Fire' (1890); and 'Derringforth' (1894).

Mun'son, James Eugene, American inventor: b. Paris, N. Y., 12 May 1825. He was educated at Amherst College and in 1857 removed to New York, where he was court stenographer for 30 years. He invented the "Munson System" of shorthand, a machine for operating the typewriter by telegraph, and a type-setting machine. He published: 'The Complete Phonographer' (1866); 'Dictionary of Practical Phonography' (1875); 'A Shorter Course in Munson Phonography' (1900); etc.

Mun'ster, Ireland, the southwest and largest of the four provinces of that country, bounded on the north by Connaught, on the east by Leinster, and on the west and south by the Atlantic Ocean. It has an area of 9,521 square miles and is divided into the counties of Clare, Cork, Kerry, Limerick, Tipperary, and Waterford. Pop. (1901) 1,076,188.

Münster, mün'stĕr, Prussia, the capital of Westphalia, a town and episcopal see, in a plain on the Aa, at the junction of several railways and on the Dortmund-Ems canal, 78 miles northeast of Cologne. The site of its mediæval ramparts has been converted into promenades. The principal edifices are the cathedral, the church of St. Lambert, the Rathaus, exchange, museum, theatre, the Pauline Library, several educational, benevolent, and charitable institutions, etc. The manufactures include woolen, linen, and cotton goods, leather, sugar, starch, etc. Münster originated in a monastery around which a settlement arose in the 12th century; it was long governed by martial bishops. The most notable event in its long history occurred in 1532–5 when the city fell into the hands of the Anabaptists (q.v.). Pop. (1900) 63,776.

Münsterberg, mün'ster-bĕrg, **Hugo,** German-American psychologist: b. Dantzic, Germany, 1 June 1863. He graduated at the Dantzic Gymnasium in 1882, and pursued post-graduate studies in physiology, philosophy, natural sciences and medicine until 1887. He received the degree of Ph.D. at Leipsic in 1885 and that of M.D. at Heidelberg in 1887. After this he was instructor and assistant professor of psychology in the University of Freiburg at Baden, Germany. In 1892 he came to America and accepted the professorship of experimental psychology at Harvard University, Cambridge, Mass., where he has remained ever since. His studies in psychology have chiefly been devoted to its physiological aspects. He is a member of the Psychological Association and was elected its president in 1898; also a member of the American Academy of Arts and Sciences. Most of his works are in the German language: 'Die Willenshandlung' (1888); 'Gedankenübertragung' (1889); 'Der Ursprung der Sittlichkeit' (1889); 'Beiträge zur Experimentellen Psychologie' (1889–93); 'Aufgaben und Methoden der Psychologie' (1891); 'Psychology and

Life' (1899); 'Grundzüge der Psychologie' (1900); and 'American Traits' (1902). He has also been a large contributor of psychological and philosophical articles to the 'Psychological Review' and many other magazines and periodicals.

Munt'jac, a small East Indian deer representing the genus *Cervulus,* which resembles the musk-deer in many points, especially in having long sharp upper canine teeth, or tusks, which are effective weapons. These little deer, only 20 to 22 inches in height, inhabit hilly jungles, and have lyrate, single-pronged antlers, mounted upon remarkably tall pedicels. Several species are known, of which the most familiar is the Kakar or barking-deer (*C. muntjac*) of Indian sportsmen, whose loud resonant cries may be heard at a surprising distance, and which is a favorite not only because it exercises skill in its pursuit, but gives excellent venison. Consult Kinloch, 'Large Game Shooting' (1885).

Münzer, münt'sĕr, **Thomas,** German religious fanatic: b. Stolberg about 1490; d. Frankenhausen 15 May 1525. He preached at Zwickau in 1520, and at Prague in 1521, promulgated his doctrines at Allstedt in Thuringia in 1523, and excited the people to revolt against the authorities. In Mühlhausen (1524) he gained the unqualified support of the populace, deposed the city council and appointed a new one, suffered the monasteries and houses of the wealthy to be sacked, and proclaimed a community of goods. He was now joined by another fanatic named Pfeifer, with his troop of rapacious followers, and this circumstance with the news that 40,000 peasants had assembled in Franconia, and plundered and burned 150 castles of the nobles and 23 monasteries, inflamed his zeal, and he joined in what was termed the «Peasants' War,» intending to exterminate «the godless princes and priests.» Leaving Pfeifer governor in Mühlhausen, he proceeded to Frankenhausen, and rekindled the ardor of the townspeople. The dukes of Saxony, Philip, and Brunswick, and other rulers sent a force against the insurgents; Münzer was totally defeated after an obstinate struggle, was taken and executed. See PEASANTS' WAR.

Munzinger, moont'sĭng-ĕr, **Werner,** Swiss explorer: b. Olten, Switzerland, 4 April 1832; d. Africa 14 Nov. 1875. He engaged in mercantile life and later became British and then French consul at Massowah in Egyptian Abyssinia. He explored a large part of northeastern Africa and wrote much concerning his travels. Among his works are: 'Ostafrikanische Studien' (1864); 'Vocabulaire de la Langue Tigré' (1865); etc.

Muradabad, moo-rä-dä-bäd'. See MORADABAD, INDIA.

Muræ'na, an eel or moray of the family *Murænidæ.* (See MORAY.) There can be little doubt that the *muræna* of the Roman feasts often translated "lamprey," was one of the true eels. It was held in the highest esteem. Pliny tells of the enormous sums of money and the great care which were spent on the cultivation of the muræna. The artificial fish-pond of Lucullus was said to have been sold for about $200,000; and one Hirrius is said to have furnished Cæsar with 6,000 murænas alone for a regal entertainment given to the people. We are also told that these fishes were kept as pets by both sexes of the Roman nobility. See MULLET.

Mural Circle, in astronomy, an instrument formerly employed in observatories to measure the zenith distances of stars. The mural circle is now superseded by the transit instrument.

Mural Decoration. Mural decoration includes, besides wall painting, the facing of the walls with marble, arranged in patterns or carved in relief, as well as the use of tiles, mosaic, decorative plaster, sgraffito, fresco, and stenciling; also of such wall coverings as tapestry, painted hangings, printed papers and cloths. The history of mural decoration takes us back to the earliest times. In early Egypt the wall surfaces were covered with conventional figures, or vertical stripes and zigzags, cut in slightly below the surface. These early patterns, as well as the human figures and hieroglyphics of later and more elaborate work, were carefully colored. Painting of patterns and human subjects on the uncarved flat surface was also used: but always in flat color, without gradation, and therefore wholly conventional in character. In Babylonia and Assyria, wall surfaces were frequently covered with alabaster slabs, carved in low relief, and with enameled and colored bricks. In Greece, the wall surfaces which formed the background of reliefs were frequently highly colored and much of the detail was brought out in contrasting tones. The Etruscans had a system of wall painting, and their tombs dating back to the 8th century still show examples of their work, but is of but little comparative merit. The principal specimens remaining of Roman wall-painting are to be found in Pompeii. There is also a good example in the so-called House of Livia, on the Palatine Hill in Rome. The early Christians, who held their religious services in the catacombs, were accustomed, from the 1st to the 9th century, to decorate the walls, and we have wall pictures of the 4th century still remaining. Byzantine architecture is especially noted for its mosaic wall decoration, as found, for example, in Santa Sophia, Constantinople, and Saint Mark's, Venice. Romanesque examples are found in the Cathedral of Monreale, Sicily, the church of San Clemente, Rome, and San Miniato, near Florence. Gothic church architecture depends more for its decoration on its stained glass than upon wall painting or mosaic, although in Italian Gothic art examples of colored mural decoration are numerous. Under the influence of the Renaissance wall paintings were numerous and beautiful, especially in Florence and Sienna; and soon the palaces of Rome surpassed even those, the work being generally in fresco. Later work, especially after the introduction of oil painting, grew to have somewhat of the nature of easel pictures. There are good examples of this later Renaissance style in the Doges' palace in Venice, and in the Italian churches, and it reappears in the modern work of the Pantheon and the Hotel de Ville, Paris. In America, the wall paintings at the Boston public library and the Library of Congress, besides some recent work in New York city, are worthy of attention.

The names of the painters who have left us wall decorations as products of their work give us a key to the progress of mural painting.

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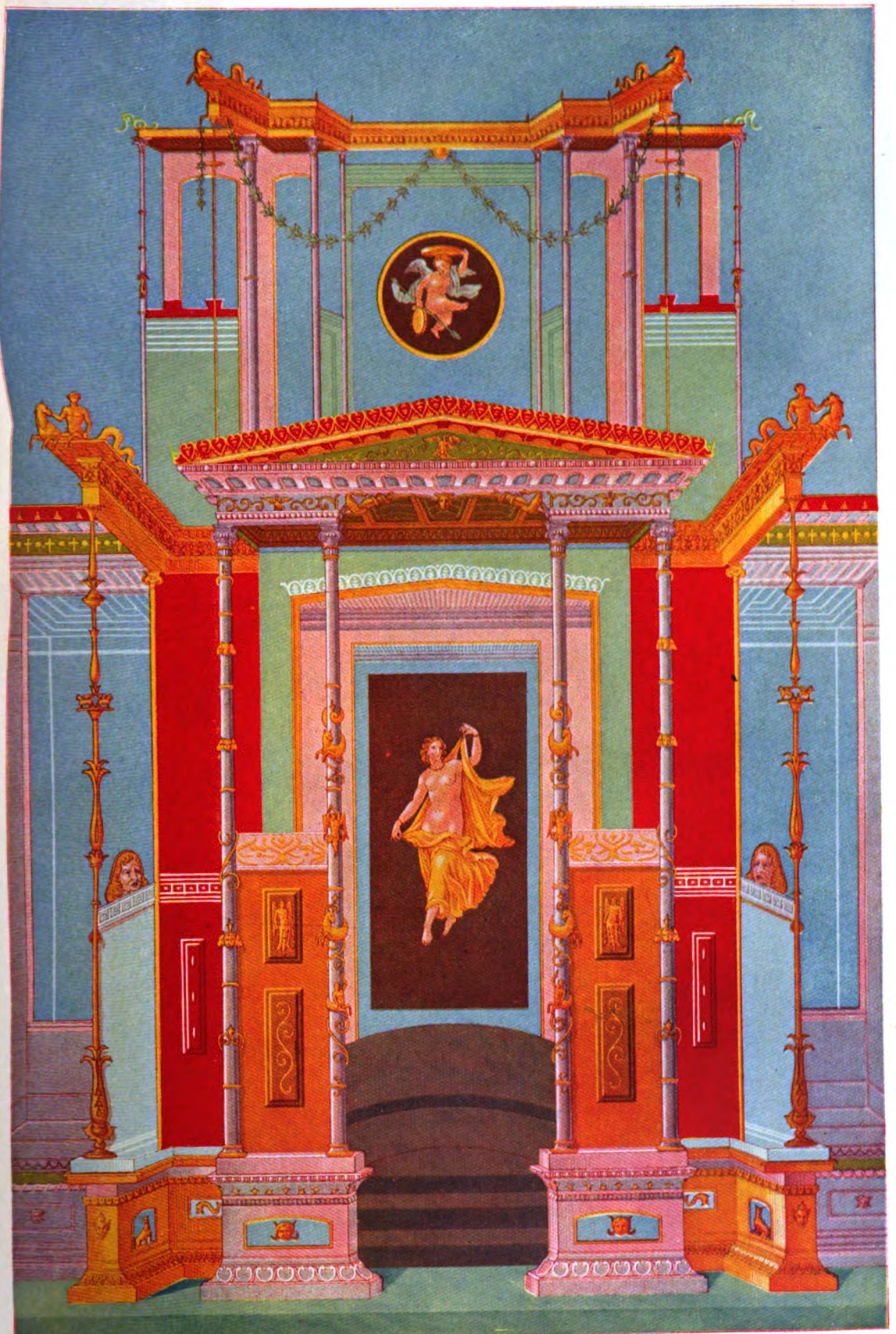

GRÆCO-ROMAN MURAL DECORATION

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From the time when Giotto gave life to a dead art to the time of Puvis de Chavannes is a period of 500 years. Following Giotto came the Florentines, such as Orcagna, Masaccio, Benozzo, Gozzoli, Lippi, and Ghirlandajo, and the Umbrians and Siennese, such as Lorenzetti, Signorelli, Perugino, Pinturicchio, and Raphael. This great period of mural painting culminates in the work of Michelangelo in the Sistine Chapel. Later came the Venetians Titian, Paul Veronese and Tintoretto; but their work was generally on canvas, stretched on frames. From the period of the Renaissance to the last part of the 19th century there was little notable mural decoration, but since then there have come Hippolyte, Flandrin, Puvis de Chavannes, and Baudry, in France; La Farge, Abbey, Blashfield, Walker, Vedder, Mowbray, Cox, Simmons, Blum, Reid, Turner, and Sargent, in America, have been carrying out wall decorations in a manner that speaks encouragingly for the 20th century. Among the more celebrated and important pieces of mural painting are La Farge's 'Ascension of Christ' in the church of the Ascension, New York, and his decoration of Trinity Church in Boston; Simmons' paintings in the criminal court building, New York; Blashfield's in the Congressional Library at Washington; and the magnificent pictures by Sargent in Sargent Hall, Boston public library.

Mosaic.— For external pictorial decoration mosaic is the best medium. It is made generally of small glass tesseræ, which can be colored freely, and even gilded by the insertion of leaf gold, producing permanent metallic lustre in backgrounds and ornaments. Mosaic may be used on a large scale with stone, brick, or terra-cotta, and either polished or left with a dull finish. Mosaics may be of marble or of glazed tiles; but the term when used without qualification refers to work done with very small tesseræ as stated above.

Fresco.— The name "fresco" means painted in water-color upon fresh plaster, and this was the great medium of the Renaissance men. Encaustic means that heat is applied in fixing the color. Encaustic was used especially by the Greeks and Romans, but little is known of the exact process. The only example of the Pompeian decoration that has been brought to America is that in the Metropolitan Art Museum in New York, taken from the Boscoreale Villa, near Pompeii, buried in the eruption of Mount Vesuvius in 79 A.D. These were unearthed in 1901, and the entire plaster walls of one room and sections from other parts of the villa were brought late in the year 1903.

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FRANK A. BOURNE,
Architect, Boston, Mass.

Murat, Joachim, zhō-ä-kēm mü-rä, French marshal and some-time king of Italy: b. Bastide, Lot, France, 25 March 1771; d. Pizzo, Calabria, Italy, 13 Oct. 1815. He was the son of a prosperous innkeeper of La-Bastide-Fortunière, near Cahors, France, and had a remarkable career. While studying for the priesthood at Toulouse he enlisted in a cavalry regiment but was soon dismissed for insubordination. He served in the constitutional guard of Louis XVI.; then entered the 12th regiment of mounted chasseurs and rose by his zealous Jacobinism to the rank of lieutenant-colonel. He attached himself to Napoleon in 1795, and followed him to Italy and to Egypt. In these campaigns he frequently distinguished himself, and in 1799 Napoleon appointed him general of division. He clung close to the great leader and returned to France with him from the disastrous Egyptian campaign. At a time when everything depended on prompt action he rendered Napoleon most valuable service by dispersing the Council of Five Hundred at Saint Cloud, on the memorable 18th Brumaire. In gratitude and as a reward Napoleon entrusted him with the command of the Consular Guard, and shortly after (20 Jan. 1800) gave him his youngest sister, Caroline, in marriage.

Murat had command of the cavalry at the battle of Marengo and expelled the Neapolitans from the Papal States. In 1803 he was made a member of the *Corps Legislatif*, and in 1804 was the governor of Paris. On the establishment of the Empire Murat became one of the popular idols, and was showered with honors. He was made marshal of the empire, grand-admiral, and prince of the imperial house. His services in the campaign of 1805 against Austria, in which he entered Vienna at the head of the army, were rewarded in 1806 with the grand-duchy of Cleves and Berg. He participated in the battles of Austerlitz, Jena, Eylau and Friedland. In the war of 1806 with Prussia, and of 1807 with Russia, he commanded the cavalry, and in 1808 he commanded the French army which occupied Madrid, and quelled the insurrection there in May. He expected to receive the crown of Spain, as Charles IV. had invested him with royal authority; but Napoleon, who destined Spain for his brother Joseph, placed him on the throne of Naples 15 July 1808. He then took the title of "Joachim Napoleon." Ferdinand IV. (q.v.), however, continued to rule in Sicily under English protection. Murat proved a beneficent king and instituted some reforms, but he was, after all, but the tool of Napoleon. He shared the hardships and reverses in the disastrous Russian campaign of 1812, and returned to Naples discouraged and discontented. In 1813 he again fought for Napoleon, whose cause he deserted after the battle of Leipsic. He entered into a treaty with England and Austria in 1814 which guaranteed him his throne on condition that he would join the coalition against Napoleon. He took up arms again in 1815 for Napoleon; but being defeated by Generals Neipperg and Bianchi he was forced to leave Italy, and took refuge in Toulon. After the overthrow of Napoleon he escaped to Corsica, and set sail for the Neapolitan territory with a view to recover his kingdom. He foolhardily landed at Pizzo on 8 October, but was immediately captured, tried by court-martial, condemned and shot.

Murat, Napoleon Achille, French American author: b. Paris 21 Jan. 1801; d. Wasceissa, Leon County, Fla., 15 April 1847. He was the son of Joachim Murat, king of Naples, and before his father's overthrow bore the title of Prince of the Two Sicilies. When his father lost the throne he sought refuge in Austria, where he received his education. In 1821 he came to the United States, and after an extended tour through the country bought a large estate and settled near Tallahassee, Fla., where he devoted himself to farming and literary work; he also gave largely to and was active in philanthropic enterprises. He became a United States citizen, and in 1824 was made alderman of the city of Tallahassee, in 1825 mayor, and in 1826 postmaster. He accompanied Lafayette during most of his visit to the United States, and at that time was introduced to Catharina Dudley, a grandniece of Washington, whom he afterward married. He refused many offers of political advancement, and lived quietly on his estate. In 1828 he published in the Paris 'Revue Trimestrielle' a series of letters on political parties in the United States, which were later published as 'Lettres d'un Citoyen des Etats Unis à ses Amis d'Europe'; in 1838 he published 'Esquisses morales et politiques sur les Etats Unis d'Amérique'; and 'Exposition des Principes du Gouvernement républicain tel qu'il a été perfectionné en Amérique' (Exposition of the Principles of Republican Government as Perfected in America). This latter work was very popular among those of republican sympathies in Europe, was translated into several different languages, and passed through over 50 editions.

Murat, Napoléon Lucien Charles, nä-pō-lā-ôṅ lü-sē-ôṅ shärl, Prince of Ponte Corvo, French politician, second son of Joachim Murat: b. Milan 16 May 1803; d. Paris 10 April 1878. He left Italy for Austria with his mother in 1815; started for the United States in 1824, but was shipwrecked on the Spanish coast, and held prisoner for a time; arrived in Boston in 1825; and in 1827 married an heiress of Bordentown, N. J., Georgina Fraser, who was soon afterward reduced to school teaching for her living. Murat returned to Paris in 1848, sat in the Constitutional Assembly and in the Legislative Assembly (1849), was minister to Turin (1849–50), had his debts paid and received a pension of $30,000 a year under Napoleon III., and in 1859–60 made a feeble claim to the crown of Naples, but received no support from France. His vote in the Senate, where he sat from 1852 to 1870, for the temporal power of the Pope, alienated from him the French Freemasons, whose grand-master he had formerly been. He retired to private life after the revolution of 4 Sept. 1870.

Muravieff, moo-rä-vē-ĕf', Russian noble family, originally settled in the grand-duchy of Moscow, but in 1488 receiving from Ivan Vassilievitch holdings in Novgorod. Its chief members are: Nikolai Jerofeyevitch, d. Montpellier 1770, governor of Livonia, and author of the first Russian algebra. Mikhail Nikititch, b. Smolensk 25 Oct. 1757; d. Saint Petersburg 29 July 1807; was chosen tutor to the grand-dukes Alexander and Konstantin in 1785, rector of the University of Moscow (1796), and secretary of state to the ministry of public instruction (1801); and wrote a manual of ethics, which is classic in Russia (1810, 1815). Nikolai Nikolaievitch, son of the governor of Livonia: b. Riga 1768; d. Moscow 1 Sept. 1840; was educated at Strasburg; entered the navy 1788; was captured in 1790; was transferred to the army in 1796; and from 1797 to 1823, with the exception of service against Napoleon in 1812–14, he was at the head of a private military school near Moscow, which was bought by the government in 1816. His son, Alexander Nikolaievitch, b. 1792; d. Moscow 1864; was sent to Siberia for his part in the conspiracy of 1825; was pardoned; served in the Crimean war; and as governor of Nijni Novgorod did much for the abolition of serfdom. Another son, Nikolai Nikolaievitch, b. Saint Petersburg 1793; d. there 4 Nov. 1866; entered the army at 17; served in the Caucasus; was sent to Khiva 1819; distinguished himself in the war with Turkey, 1828–9, and in the Polish campaign, 1831; in 1832 treated with Mehemet Ali; was disgraced and retired in 1838, but reinstated in 1848; and in 1855 commanded the army in the Caucasus. He wrote a valuable book about his travels in Khiva (1822), and on the campaign in the Caucasus in 1855 (1876). His brother, Mikhail Nikolaievitch, b. 1795; d. Syrez, near Luga, 10 Sept. 1866; became major general in 1830; was military governor of Grodno; was a member of the Council of State, 1850–62; opposed the emancipation of the serfs; used such cruelty in putting down a student rising in 1861 that he was forced to resign; but in 1863 was sent to Wilna as governor-general, and won from the Poles the name of the Hanger or Executioner by his pitiless severity; and in 1866 was president of the commission which examined Karakasoff, who attempted to assassinate Alexander II. His memoirs were published by his grandson, Mikhail Nikolaievitch, b. 7 April 1845; d. 8 June 1900; ambassador to Berlin (1885), to Copenhagen (1893); and from 1897 to his death foreign minister. He did much to solve the Cretan question, published the invitation to the Hague Peace Conference (1898), and forwarded Russia's interests in China. Another Nikolai Nikolaievitch, Count Muravieff Amursky, b. Saint Petersburg 1809; d. Paris 19 Nov. 1881; fought in the war with Turkey, 1828–9; became governor-general of Eastern Siberia in 1847; in 1858 concluded the treaty of Aigun with China, by which Amur was ceded to Russia, and thus won the title Amursky; and in 1859 arranged a treaty with Japan at Yeddo. The last 20 years of his life were spent in Paris. The Muravieff-Apostol branch of the family, so called because of its intermarriage with that of Apostol, a Cossack hetman, is most prominently represented by Ivan (1769–1851), who translated Aristophanes, Horace, Sheridan, etc., into Russian; and by his son Sergei (1796–1826), who took part in the conspiracy of 1825 and was executed in Saint Petersburg.

Murchison, mẽr'kĭ-sŏn, Sir **Roderick Impey,** Scottish geologist: b. Tarradale, Ross, Scotland, 19 Feb. 1792; d. London 22 Oct. 1871. He was educated at the military college in Great Marlow and at the University of Edinburgh;

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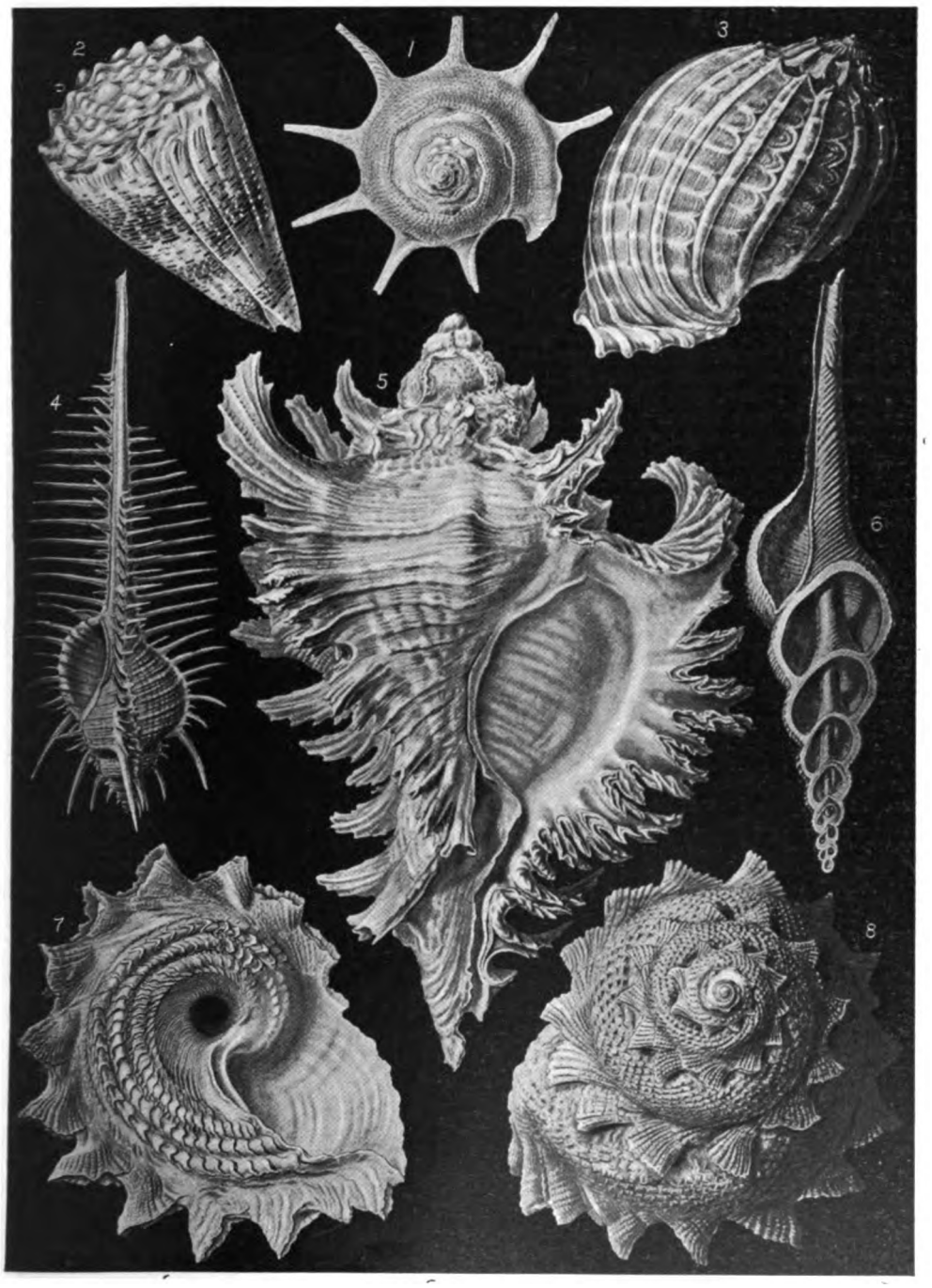

1. Calcar triumphans. 2. Conus imperalis. 3. Harpa ventricosa. 4. Murex tenuispinus. 5. Murex inflatus. 6. Fusus longicauda. 7, 8. Australium imperiale.

entered the army in 1807 and served under Wellington in the Peninsular campaign, but retired from the army with the rank of captain of dragoons in 1815. He then took up the study of science and spent years in scientific investigations, particularly in that of geology. In 1825 he became a member of the Geological Society of London, of which he was president in 1831–2 and in 1842–3. His investigations extended through France, England and Wales and he reclassified the Palæozoic rocks giving to his new system the name Silurian in 1835. In 1841 he was commissioned by Emperor Nicholas to make a geological survey of Russia and was engaged in that work until 1844 making discoveries which enabled him to present to the scientific world the Permian system. He was one of the founders of the British Association for the Advancement of Science and presided over it in 1846. He was several times elected president of the Royal Geographical Society and from 1862 until his death was continuously re-elected. In 1855 he was appointed director of the British Geological Survey. He published: 'Geology of Cheltenham' (1834); 'The Silurian System' (1839); 'Geology of Russia in Europe and in the Ural Mountains' (1845); 'Geological Atlas of Europe' (1856); etc. See Geikie, 'Memoir of Sir Frederick Murchison' (1875).

Murchisonite, a flesh-red variety of the mineral orthoclase, which exhibits golden-yellow reflections when viewed from certain directions. It occurs at Dawlish and Exeter, England, and is named for its discoverer, Sir Roderick I. Murchison.

Murcia, mėr'shĭ-ą (Sp. moor'thē-ä), Spain, the capital of the ancient kingdom and modern province of same name, 30 miles northwest of Cartagena, on the Segura, which divides the town into two unequal portions, connected by a handsome bridge. The city is surrounded by a brick wall, and is entered by three principal gates. The streets are generally broad, straight, and well paved. Among the public buildings the most important is the cathedral, its principal façade a fine combination of Corinthian and composite architecture. It was begun in 1353. In the plaza stands the capacious episcopal palace, built in 1752, one of the finest edifices of its class in Spain; and in close proximity to it the colleges of St. Fulgentius and St. Isidore, which form one range of building. The bishop takes his title from Cartagena, from which town the see was transferred. The other public edifices and institutions consist of the college of St. Leander, which is an academy of music connected with the cathedral; the hospital of St. John, with which is connected a hospital for convalescents; a house of refuge, a foundling hospital, the town-house, an institute for advanced education, a school of design, an ecclesiastical seminary, several nunneries, a bull-ring, and a good botanical garden. There are manufactures of coarse cloths and baize of different colors; of silk-stuffs, especially taffeta and plush; linens, hats, gloves, saltpeter; also silk spinning-mills, dye-works, potteries, tanneries, soap-works, and about thirty flour-mills. Considerable commerce is carried on in silks and other manufactures, as well as in grain, etc. Pop. (1900) 111,693.

Murder. See Homicide.

Murdoch, mėr'dŏk, **James Edward,** American actor: b. Philadelphia, Pa., 25 June 1811; d. Cincinnati, Ohio, 19 May 1893. He made his dėbut as an actor in Philadelphia in 1829, playing Frederick in 'The Lover's Vow,' and in 1838 appeared in New York as Benedick in 'Much Ado About Nothing.' He played Pythias to Edwin Forrest's Damon and in 1842 retired from the stage to study. He reappeared in New York in 1845 as Hamlet and for 15 years played with great success in the United States and England. During the Civil War he devoted himself to caring for the wounded soldiers and in giving entertainments for their benefit. His best roles were Hamlet, Mercutio, Benedick, and Claude Melnotte, in which he had few equals. He published with William Russell: 'Orthophony' (1845); and 'The Stage' (1885).

Murdock, Harold, American banker: b. Boston, Mass., 1862. He was educated at the Boston Latin School, entered the banking business and is president of the National Exchange Bank of Boston. He wrote: 'The Reconstruction of Europe: a Sketch of the Diplomatic and Military History of Continental Europe from the Rise to the Fall of the Second Empire' (1889).

Murdock, William, Scottish inventor: b. Bellow Mill, near Old Cumnock, 21 Aug. 1754; d. Sycamore Hill, near Soho, 15 Nov. 1839. He went in 1777 to Birmingham, where he obtained employment in the famous engineering establishment of Boulton & Watt, at Soho, near that town. A demand for Watt's pumping-engines came from the Cornish mines, and Murdock was soon sent thither to superintend the erection and fitting of these engines. In 1800 he was made manager of the works of Boulton & Watt, being afterward admitted as a partner. He retired in 1830. His invention of coal-gas lighting remains his most conspicuous achievement. He began in 1792 his experiments regarding the illuminating properties of gases produced by distilling wood, peat, and coal. In 1800 he had an experimental gas apparatus in operation at Soho, and in 1803 the Boulton and Watt foundry was regularly lighted by that means. In February 1808, Murdock read before the Royal Society a paper detailing his investigations. Gas-lighting fell into the hands of promoters, and in 1809 Murdock was compelled to publish a vindication of his claims in 'Letter to a Member of Parliament.' It has been asserted that he invented the steam locomotive, but the three engines he made came to nothing.

Mu'rex, a genus of gasteropod mollusks typical of the family *Muricidæ,* resembling the whelk; shell spiral, rough, with three or more ranges of spines simple or branched. Murices are remarkable for the beauty and variety of their spines. They were in high esteem from the earliest ages on account of the purple dye that some of them yielded. See Purple Shell.

Mu'rexide, in chemistry, the hydrogen-ammonium salt of a hypothetical acid called «purpuric acid,» the acid itself not being known in the free state. Murexide has the chemical formula $C_8H_4N_8O_6(NH_4)$, and about 1855 it was largely used as a dye. The colors that it gives are fast so far as light is concerned, and are quite brilliant; but they tarnish quickly when exposed to sulphur dioxid gas, and hence are more or less fugitive in houses where coal gas is

burned. As a dye, murexide has now been replaced by the coal-tar colors (q.v.). It may be prepared by evaporating a mixture of uric acid and nitric acid to dryness, and moistening the reddish residue with ammonia. The beautiful purple red of murexide is at once developed. (This reaction is used as a test for uric acid, in urinary analysis.) Murexide dissolves in water to a beautiful purple solution, the color changing to blue upon the addition of potash. The commercial supply of murexide, when it was used as a dye, was prepared from uric acid; the uric acid required being obtained from guano, in which it exists in considerable quantities. A dye similar to murexide, and perhaps identical with it, was obtained by the ancients from a gland of the murex, or "purple-fish"; whence the name "murexide."

Murfree, mėr'frē, **Mary Noailles** ("CHARLES EGBERT CRADDOCK"), American novelist: b. Murfreesboro, Tenn., 24 Jan. 1850. Her early years were spent in Murfreesboro to which after some years in Saint Louis she returned in 1890, and her careful studies of life in the mountains of Tennessee, where her summers have usually been passed, are reflected in nearly all of her books. Her earliest short story appeared in the 'Atlantic Monthly' in 1878, and was followed by others over the signature "Charles Egbert Craddock." Until her identity was revealed in 1885 they were supposed to be the work of a masculine writer. She has published: 'In the Tennessee Mountains' (1884); 'Where the Battle was Fought' (1884); 'The Prophet of the Great Smoky Mountains' (1885); 'Down the Ravine' (1885); 'In the Clouds' (1886); 'The Story of Keedon Bluffs' (1887); 'The Despot of Broomsedge Cove' (1888); 'His Vanished Star' (1894); 'The Phantoms of the Footbridge' (1895); 'The Mystery of Witchface Mountain' (1895); 'The Juggler' (1897); 'The Young Mountaineers' (1897); 'The Bushwhackers' (1899); 'The Story of Old Fort Loudon' (1899); 'The Champion' (1902); 'A Sceptre of Power' (1903).

Murfreesboro, mėr'frēz-bŭr-ō, Tenn., city, county-seat of Rutherford County; on the Nashville, C. & St. L. railroad; about 33 miles southeast of Nashville. The first settlement was made in 1811 and in 1817 it was incorporated. It was the capital of the State from 1819 to 1826. It is in an agricultural section in which cotton is one of the principal products. The city has a number of manufacturing establishments, chief of which are flour and lumber mills, tanneries, cotton gins, cotton compresses, machine-shops, red cedar ware factories, and carriage factories. On the site of the Stone River battlefield, near the city, is a National cemetery which contains the graves of 6,150 soldiers, 2,333 of unknown dead. (See STONE RIVER, BATTLE OF.) It is the birthplace of the author, Mary Noailles Murfree (q.v.). Pop. (1890) 3,739; (1900) 3,999.

Murger, Henri, ŏn-rē mür-zhār, French poet and novelist: b. Paris 24 March 1822; d. there 28 Jan. 1861. He entered a lawyer's office, but left it, and was for a time secretary to the Russian Count Tolstoi. Of his career in 1838–48 almost nothing is known. He was a member of an informal club or clique of unconventional and impecunious young artists and authors, which was named "Bohemia," and the associates "Bohemians"—a name famous in general literary history. He contributed a great mass of "copy" to numerous periodicals, and at last made a reputation by his 'Scènes de la Vie de Bohème' in which he appears as Rodolphe (1848). He then found sufficient to do, wrote dramas for the Luxembourg Theatre, and articles for the 'Revue des Deux Mondes.' Other works are: 'Scènes de la Vie de Jeunesse' (1851); 'Le Pays Latin' (1852); 'Le Dernier Rendezvous' (1852); and 'Les Buveurs d'Eau' (1854). Many of his lyrics are very beautiful, and his prose works, especially his masterpiece, are characterized by rare humor and pathos. Consult the appreciation in Saintsbury's 'Essays on French Novelists' (1891).

Murghab, moor-gāb', a river of Central Asia, which rises on the northern frontier of Afghanistan, in the Paropamisus Mountains, and after a northwestward course of nearly 400 miles, loses itself in the desert sands surrounding the oasis of Merv.

Mu'riacite. Same as ANHYDRITE (q.v.).

Muriat'ic Acid. See HYDROCHLORIC ACID.

Murichi, or **Morichi,** a South American palm of the genus *Mauritia* (*M. flexuosa*), also known as ita-palm; it is nearly related to the *buriti* (q.v.) or wine-palm. These palms reach a height of 100 to 150 feet, and grow along the Orinoco River, forming great forests near its mouth. It furnishes to the Indians of that region almost everything; and during much of the year, when the lowlands adjacent to the river are flooded, they dwell among its branches, like monkeys, for want of dry land upon which to rest or travel. "At the time of the inundations," says Humboldt, "the tufts of the fan-leaved murichi present the appearance of a forest issuing from the bosom of the waters. The navigator, traversing at night the branches of the Orinoco delta, sees with surprise the crowns of these palms lighted up by large fires. These are the habitations of the Guaranis suspended from the trunks of the trees. These people stretch mats in the air, fill them with earth, and on this bed of wet clay light what fires they require for household purposes. For ages they have owed their liberty and political independence to the treacherous and miry nature of their soil, which they traverse in seasons of drought, and over which they alone know how to pass in safety; to their isolation in the delta of the Orinoco, and to their living in the trees." Consult: Von Humboldt, 'Voyage aux Régions Equinoxiales,' Vol. VIII., p. 363 (1807–27).

Mu'ridæ, the family of mice and rats (qq.v.).

Murillo, mū-rĭl'ō (Sp. moo-rēl'yō), **Bartolomé Estéban,** bär-tō'lō-mā ās-tā'bän, Spanish painter; b. Seville, end of December 1617; d. there 3 April 1682. He began his art education under Juan del Castillo, and in 1642 sought wider experience in Madrid, where his townsman Velasquez was enjoying a brilliant career. By the latter he was dissuaded from a contemplated visit to Rome and secured facilities for studying in the Royal Galleries and in the Escorial. Here he placed himstlf for three years under the inspiration of Ribera, Titian, Rubens, Vandyke and Velasquez himself. In 1645 he returned to Seville where he undertook to paint 11 separate pictures for the cloister of Saint

Francis in illustration of Franciscan history. These works proved the foundation of his renown. The principal pieces of this series are 'Saint James Distributing Alms' (now in the Academy Fernando, Madrid); the so-called 'Angel Piece' (in the Louvre); 'The Death of Saint Clara' (in the Dresden Gallery). These strike the note of the early Seville school, being warm in tone, and exhibit Murillo as drawing his types of beauty from the lower orders of the Spanish people. Of even more transparent coloring are his 'Saints Leander and Isidore' in the sacristy of the Cathedral at Madrid; 'The Birth of Mary' (in the Louvre); and the 'Vision of Saint Anthony' (in Seville Cathedral, 1656); both of these latter belong to the middle period of his artistic development. In 1665 he began his four pictures for the Church of Santa Maria pa Blanca, among them being his 'Church Triumphant'; 'The Immaculate Conception' (in the Louvre); and 'The Foundation of the Church of Santa Maria Maggiore at Rome' (in the Madrid Academy). In 1668 he painted his 'Madonna Hovering in the Clouds Surrounded by Eight Saints of Seville' (in the chapter house of Seville cathedral); and about 1670 his 'Holy Family with Elizabeth and The Infant Baptist' (in the Louvre). His most brilliant period was between 1670 and 1680; and in 1674 he had completed the eight vast pictures illustrating the 'Corporal Works of Mercy.' These were intended for the church of the Caridad Hospital, and are remarkable for splendor of coloring and strength of design; the faces are lifelike in expression and the composition and perspective faultless. His 'Saint Elizabeth of Hungary Nursing the Sick' (in the Madrid Museum) belongs to this period. In 1676 he executed 20 pictures for the Capuchin monastery at Seville, 17 of which are now in the local museum. It was at this time he painted the famous 'Immaculate Conception' which Maréchal Soult took to France and sold to the nation for 615,000 francs. It is now in the Louvre, and is the work by which this painter is most popularly known. While Murillo was engaged at Cadiz in painting 'The Betrothal of Saint Catherine' for the high altar of the Capuchin church, he fell from the scaffolding and died as the result of his injuries. The work was completed by his pupil Osorio with no particular success.

Murillo has left about 400 pictures, including his devotional paintings and the many representations of the 'Immaculate Conception,' one of his favorite and characteristic subjects. His most important work in the United States is the altar-piece in the Cathedral of Saint Peter's at Cincinnati. He was the greatest of Spanish religious painters because his Madonnas are real Spanish women and only raised by the magic of his brush into sainthood or apotheosis. But he was a great genre painter also. He knew the gypsies and beggars of Spain as well as he knew the saints. He could paint landscape and portrait, flowers and fruit, maidens and children of that Seville which he loved so well and never left for France or Italy. Unswayed by the influence of the dazzling schools of Tuscany or Flanders he has confined himself to Spanish faces, to Spanish atmosphere and scenery, and has realized a manner and color of his own. If he has sacrificed in this way anything of vigor or variety he has gained far more in originality, sincerity, verisimilitude, and an individuality which is truly national.

Consult: Tubino, 'Murillo, su epoca, su vida, sus quadros' (1864); Curtis, 'Velasquez and Murillo' (1881); Lefort, 'Murillo et ses élèves' (1892).

Mur'muru Palm. See ASTROCARYUM.

Murner, moor'nĕr, **Thomas,** German satirist and opponent of the Reformation: b. Strasburg 24 Dec. 1475; d. about 1536. He studied at the principal universities of Europe, devoting himself particularly to theology and philosophy, and early gained a reputation for ability, marred however by a quarrelsome disposition. He led an unsteady life, preaching for some time at Frankfort-on-the-Main and other places, but incurring generally the displeasure of his congregations by the coarse personalities of his sermons, and was successively expelled from Freiburg, Treves, and Venice. He became one of the most virulent opponents of the Reformation. Some of his writings against the Reformation were burned by order of the diet of Worms; and he was compelled to flee to Switzerland, whence he was in time likewise expelled. The latter part of his history is not known. In 1506 he had been crowned as poet laureate by the emperor Maximilian; and his 'Narrenbeschwörung' (1512), of which his 'Der Schelmenzunft' (1512) may be regarded as a continuation, is one of the most remarkable imitations of Sebastian Brant's celebrated satirical poem entitled 'Narrenschiff.' He wrote 'Chartiludium logice,' etc. (1507), and other Latin works; prepared a German version of Virgil and other translations; and was also regarded as the editor of 'Eulenspiegel.' But he is chiefly remembered by his writings against Luther and the Reformation. His most celebrated satirical work is entitled 'Von dem grossen Lutherischen Narren' (1522; new ed., 1848). Consult: Lappenburg, 'Murners Eulenspiegel' (1854); Goedeke, 'Murners Narrenbeschwörung' (1879); Kawerau, 'Thomas Murner und die Kirche des Mittelalters' (1890).

Mur'phey, Archibald De Bow, American jurist: b. Caswell County, N. C., 1777; d. Hillsboro, N. C., 3 Feb. 1832. He was graduated from the University of North Carolina in 1799 and was for the three succeeding years professor of ancient languages there. He studied law and was admitted to the bar in 1802 and established a large practice. He was a member of the State senate in 1812–18 and proved himself an able legislator, advocating internal improvements and working earnestly to enlarge and improve the educational system of the State. In 1818 he was a judge of the superior court and in 1819–20 was a justice of the supreme court of North Carolina. He published: 'Memoir of Improvements Contemplated, and the Resources and Finances of the State' (1819); 'Reports of Cases in the Supreme Court of North Carolina in 1804–13 and 1818–19' (1821–6); etc.

Mur'phy, Arthur, British dramatist: b. Clooniquin, near Elphin, County Roscommon, Ireland, 27 Dec. 1727; d. 18 June 1805. He was educated at the Roman Catholic College of St. Omer, France, and was subsequently employed in a London banking house. In 1758 appeared

his first drama 'The Upholsterer,' a farce, directed against politicians, which proved very successful, followed by 'The Orphan of China'; 'The Way to Keep Him'; 'All in the Wrong'; 'The Citizen'; 'The Old Maid'; 'Three Weeks after Marriage'; 'Zenobia'; 'The Grecian Daughter'; etc. At various times in his life he engaged in political controversies, and edited journals opposing Mr. Fox, the first Lord Holland, and Wilkes' 'North Briton.' His plays are his best performances, and some of them, including 'The Way to Keep Him' and 'Three Weeks after Marriage,' long kept the stage.

Murphy, Charles Francis, American politician: b. New York 20 June 1858. He received a public-school education, in 1900 became a member and treasurer of the board of commissioners for docks and ferries, in 1892–1901 was chairman of the Tammany Hall Democracy, and in 1902 became its chief.

Murphy, Francis, American temperance evangelist: b. Wexford, Ireland, 24 April 1836. During the Civil War he served in the Union army. In 1870, at Portland, Maine, he began the organization of temperance reform clubs, which were established in all parts of the State, and of which he was the first president. He made his headquarters in Pittsburg, Pa., where, after his first address, in 1876, the pledge was signed by 45,000 people; and before long the signatures secured throughout the United States in response to his endeavors numbered as many as 10,000,000. His labors were also carried into England with noteworthy results. During the Spanish-American War he served as chaplain in the United States army. He still devotes himself to his evangelistic work.

Murphy, Franklin, American manufacturer and politician: b. Jersey City, N. J., 3 Jan. 1846. He entered Newark Academy, but at 16 enlisted in the army and served throughout the Civil War, being promoted to the rank of 1st lieutenant; he was engaged in the battles of Antietam, Chancellorsville, Gettysburg, and others of importance. At the close of the war he established at Newark a varnish manufacturing business which has grown into a large establishment of wide reputation. He began his political career as member of the common council at Newark, and was also member of the State legislature for six years. In 1892 he became chairman of the Republican State Committee in which capacity he conducted two successful gubernatorial campaigns. In 1902 he was elected governor of New Jersey by 17,000 majority. He is also a member of the Republican National committee.

Murphy, Henry Cruse, American politician and historian: b. Brooklyn, N. Y., 5 July 1810; d. there 1 Dec. 1882. He was graduated at Columbia in 1830, studied law, was admitted to the bar in Brooklyn, became city attorney there, and in 1842 was elected mayor. In 1843 he was elected to Congress; was a delegate to the New York Constitutional Convention in 1846; and in 1847 re-entered Congress. From 1857 to 1861 he served as United States minister to Holland. He became well known as a journalist, being for some time editor of the Brooklyn *Eagle;* and through the publication of his studies in the colonial history of New York valuable documents were brought to light. He translated from the Dutch De Vries' 'Voyages from Holland to America, 1632 to 1644' (1853), and his other publications include: 'Henry Hudson in Holland: Origin and Objects of the Voyage which Led to the Discovery of the Hudson River' (1859); 'Jacob Steendam, Noch Vasater' (1861); 'Anthology of the New Netherlands' (1865); and 'The Voyage of Verrazzano' (1875).

Murphy, John Francis, American painter: b. Oswego, N. Y., 11 Dec. 1853. He came to New York in 1875 and educated himself in art, giving especial attention to landscape painting. His first picture to appear in the National Academy of Design was exhibited in 1876, and since 1887 he has been a National Academician. His painting 'Tints of a Vanished Past' gained the Haligarten prize (1885). In 1887 he was awarded the Webb prize by the Society of American Artists of which he is a member.

Murphy, Nathan O., American politician: b. Jefferson, Maine, 14 Oct. 1849. He was educated in the public schools; was a teacher in Wisconsin, 1866–9; removed to Arizona about 1870; engaged in mining, law practice, and railroad construction; was governor of the Territory in 1892 and in 1898–1902; and in 1893 was elected territorial delegate to Congress by the Republican vote.

Murphysboro, mûr'fĭz-bŭr-ō, Ill., city, county-seat of Jackson County; on the Big Muddy River, and on the Mobile & O., the St. Louis V., and the Illinois C. R.R.'s; about 140 miles south of Springfield. It is situated in an agricultural section, and nearby are coal-fields, timber, and building stone. The chief industrial establishments are foundries, machine-shops, flour and lumber mills, and brick and tile yards. There is a large trade in farm and dairy products, coal, and lumber. Pop. (1890) 3,880; (1900) 6,463.

Mur'rain, loosely, any widely prevailing and contagious disease among domestic animals. The term is applied to various specific disorders in different localities, but more particularly to the epizootic diseases, especially those of cattle. Still more strictly it is limited to the plague commonly known as the foot-and-mouth disease (aphthous fever), which attacks cattle and other animals, causing loss of appetite, febrile disturbance, lameness, vesicular eruptions on the feet and in the mouth, etc., with frequent complications. See ANTHRAX; CATTLE-PLAGUE; RINDERPEST; TEXAS FEVER.

Murray, mŭr'ā, **Alexander,** American naval officer: b. Chestertown, Md., 1765; d. Philadelphia 6 Oct. 1821. In 1776 he received a commission in the then half-organized navy, and while waiting for sea duty entered the army, serving (1776–7) as lieutenant and captain in the 1st Maryland regiment, and participating in the actions and operations near New York. Toward the end of 1777 he was given command of the Revenge with letters of marque; was captured by the British, exchanged, served with distinction on the Trumbull; was again captured and exchanged; then took command of a privateer, and served later on the Alliance. In 1798, on the reorganization of the navy, he was appointed captain and during the difficulties with France commanded the Montezuma. Transferred to the Constellation, he

served in the Mediterranean during the war with Tripoli, in which he initiated actual hostilities by attacking a flotilla of the enemy. After that war he was mainly engaged in shore duty until his death.

Murray, Alexander, Scottish linguist: b. Dunkitterick, Kirkcudbrightshire, 22 Oct. 1775; d. Edinburgh 15 April 1813. With little but self-acquired education he learned not only English, but Continental and Oriental languages, Latin, Greek, and Hebrew. After studying at the University of Edinburgh he settled as pastor (1808) at Urr, and four years later became professor of Oriental languages at Edinburgh. He edited Bruce's 'Travels' (1805), and his works include 'Outlines of Oriental Philology' (1812) and 'History of the European Languages,' the latter published after his death, with a slight autobiography and a memoir (1823).

Murray, David, American educator and author: b. Delhi, N. Y., 15 Oct. 1829. He was graduated from Union College in 1852 and in 1863–73 he was professor in Rutgers College. In 1873–9 he was adviser to the Imperial minister of education in Japan and in 1880 became secretary of the New York Board of Regents. He has published: 'Story of Japan' (1894); 'History of Education in New Jersey'; 'History of Delaware County, N. Y.'; etc.

Murray, David Christie, English novelist: b. West Bromwich, Staffordshire, England, 13 April 1847. He was educated privately and his first journalistic work was done on the Birmingham press. He removed to London in 1873 where he wrote for the *Daily News* and for the *World,* and in the Russo-Turkish war he was special correspondent for the *Times.* His first novel 'A Life's Atonement' was published in 1879 and he has since devoted himself to chiefly fiction. Among his numerous and popular novels are: 'Way of the World' (1884); 'The Weaker Vessel' (1888); 'A Rising Star' (1894); 'This Little World' (1897); 'Despair's Last Journey' (1901); etc.

Murray, George Henry, Canadian politician: b. Grand Narrows, Nova Scotia, 7 June 1861. He was educated in Grand Narrows and in Boston University and was admitted to the bar in 1883. He was appointed to the legislative council of Nova Scotia in 1889 and in 1896 became premier and provincial secretary of Nova Scotia under a Liberal administration. He was elected to the Dominion Parliament in 1897.

Murray, Grenville ("EUSTACE CLARE"), English journalist: b. 1824; d. Passy, France, 20 Dec. 1881. He was in the diplomatic service from 1851 to 1868, but was generally in discord with his superiors or with British residents. From 1869 he lived in France, where he was Paris correspondent of the *Pall Mall Gazette* and the *Daily News,* and an early contributor to the 'Cornhill.' He was one of the ablest journalists of his time. A voluminous writer, among his works were: 'The Roving Englishman,' chapters of travel (1854); 'Embassies and Foreign Courts' (1855); 'The Member for Paris' (1871); 'Young Brown' (1874); 'Turkey' (1877); 'The Russians of To-day' (1878); 'Under the Lens: Social Photographs' (1885).

Murray, James, Scottish soldier: b. about 1725; d. 1794. He was a son of the fourth Lord Elibank, and about 1740 entered the army; came with his regiment to America in 1757; at the siege of Louisburg (1758) commanded a brigade; and in the battle on the Heights of Abraham (13 Sept. 1759) led the left wing of the army under Wolfe. In 1760 he held Quebec against superior numbers of the French, in the same year served with Amherst in the reduction of Montreal, and was made governor of Quebec. From 1763 to 1766 he was governor of Canada; in 1774 became governor of Minorca; was compelled to surrender Fort Saint Philip to the French, in 1782, after a heavy siege, and upon returning to England was court-martialed and acquitted. In 1783 he was made a full general in the British army. Consult: Parkman, 'Montcalm and Wolfe' (1884, 1898).

Murray, James Augustus Henry, Scottish philologist and lexicographer: b. Denholm, near Hawick, Roxburghshire, 1837. He was graduated B.A. of London University, from 1855 till 1858 was an assistant master in Hawick Grammar-school, becoming in the latter year master of Hawick Academy, for a few years was foreign correspondent to the Oriental Bank in London, and from 1870 till his removal to Oxford in 1885 a master at Mill Hill School. He was president of the Philological Society in 1878–80 and 1882–4. Since 1879 Dr. Murray has been general editor of the 'New English Dictionary on Historical Principles,' the great work issued under the auspices of the Philological Society from the Clarendon Press, Oxford. Other works by him are: 'A Week among the Antiquities of Orkney' (1861), 'Dialects of the Southern Counties of Scotland' (1873), 'Synopsis of Paley's *Horæ Paulinæ*' (1872), 'The Romance and Prophecies of Thomas of Ercildoune' (1875), the article 'English Language' in the 'Encyclopædia Britannica' (9th ed.), and many papers on the archæology, natural history, geology and language of the border counties of Scotland. In 1884 he was awarded a civil list pension of £270 per annum.

Murray, or **Moray, James Stuart,** EARL OF. See STUART, JAMES.

Murray, John, American clergyman, founder of American Universalism: b. Alton, Hampshire, England, 10 Dec. 1741; d. Boston, Mass., 3 Sept. 1815. He was brought up in Ireland, where he joined the Methodist congregation and did some preaching, but in 1760 went to England, came under the influence of James Relly, and was excommunicated by Whitefield. He came to America in 1770; preached in Newport, Boston and Portsmouth his peculiar doctrines, which agree with modern Universalism only in the belief of universal salvation, but otherwise held to the dogma of the Trinity, of a personal devil, and of the incarnation; and at the outbreak of the Revolution was chaplain of a Rhode Island brigade for a short time, during which his resignation was demanded by the orthodox chaplains in the army. He formed a Universalist church in Gloucester, and in 1783 recovered property belonging to his parishioners which had been seized by the parish authorities, who acted on the ground that the Universalists had no corporate existence; the success of this suit was

a distinct advance in congregational freedom in New England. At his death he was in charge of the Universalist Society of Boston. He wrote 'Letters and Sketches' (1812), and an 'Autobiography,' continued and edited by his wife (1816).

Murray, John, English publisher: b. London 27 Nov. 1778; d. there 27 June 1843. He began business in 1799, early attained success, and became the friend of, as well as publisher for, some of the chief writers of the day, including Byron, Moore, Rogers, Campbell, Crabbe, Washington Irving, George Borrow, and Benjamin Disraeli. He started the 'Quarterly Review' in February 1809 in opposition to the Whig 'Edinburgh Review,' of which Gifford, S. T. Coleridge, and Lockhart were editors, and Scott and Southey contributors. By 1817 the 'Quarterly' was a great success. In 1824 Murray was involved in the controversy with Moore regarding the destruction of Byron's 'Memoirs'; and in 1826 undertook the publication of the *Representative,* a daily newspaper, which, after running six months was discontinued at a loss of $130,000. Consult: Moore, 'Life of Byron' (1830); and Smiles, 'A Publisher and his Friends' (1891).

Murray, Sir John, Canadian scientist: b. Coburg, Ontario, 3 March 1841. He was educated at Edinburgh University. In 1867 he accompanied for biological purposes an expedition to Spitzbergen and Greenland, and in 1872 was appointed one of the scientific staff of the Challenger expedition. From 1876 till 1882 he was chief assistant-editor of the scientific reports published in connection with that voyage, and in the latter year became editor-in-chief. He also accompanied several other scientific exploring expeditions in various parts of the world. Besides editing the Challenger reports a large number of papers on geographical, oceanographical, and biological subjects. He has received many honors from learned bodies, including the Royal Society's royal medal, the Founder's medal of the Royal Geographical Society, and the Cuvier prize of the Institute of France.

Murray, John Clark, Canadian educator: b. Paisley, Scotland, 19 March 1836. He was educated in the universities of Edinburgh and Göttingen and in 1862 accepted the chair of philosophy in Queen's University, Kingston, Canada. Since 1872 he has been professor of moral philosophy in M'Gill University, Montreal. He has published: 'Outlines of Sir W. Hamilton's Philosophy' (1870); 'The Ballads and Songs of Scotland' (1874); 'A Handbook of Psychology' (1885); 'An Introduction to Ethics' (1901); etc.

Murray, John O'Kane, American historian: b. Glenariffe, Ireland, 12 Dec. 1847; d. Chicago, Ill., 30 July 1885. He removed to the United States where he became a physician and author of some repute. His most important work was a 'Popular History of the Catholic Church in America' (1876) and among his other books are: 'The Catholic Heroes and Heroines of America' (1878); 'Lessons in English Literature' (1883); etc.

Murray, Lindley, American grammarian: b. Swatara, Lancaster County, Pa., 22 April 1745; d. Holgate, near York, England, 16 Feb. 1826. He was son of M. L. Murray (q.v.). He studied the law (1761–5) and practised as a barrister; but after the Revolution quitted the bar for commercial speculation, and having realized a fortune, went, in 1784, to England for reasons of health, and settled at Holgate, near York. His 'English Grammar' (1795) met with a truly enormous success, being almost universally introduced as a text-book in England and the United States, and for years was regarded as the standard authority. It passed through nearly 50 editions in its original form, and was abridged, enlarged, simplified, and otherwise edited. A corrected edition by the author was published in 1816, and his abridgment (1818) of this went through 150 editions, each of 10,000 copies. His work was far from accurate, however, and was soon superseded; but it freed a difficult subject from chaos. He wrote further educational and religious works, and an autobiography edited and continued by Frank (1826).

Murray, Mary Lindley, American heroine: b. Pennsylvania; d. New York 25 Dec. 1782 (O. S.). She is known through an incident of the Revolution. On 15 Sept. 1776 the British line of march passed her residence, "The Grange," a small country-seat at Murray Hill, New York. Putnam, having evacuated New York, was at the same time marching along the Bloomingdale road near the North River, intending to join Washington at Harlem Heights. Howe thought by marching across the island to cut off the American retreat. He was, however, invited, with his officers, to luncheon at "The Grange" by Mrs. Murray, accepted, and remained more than two hours, during which time Putnam escaped. A bronze tablet in commemoration was placed in the parked enclosure on Park Avenue below 37th Street on Evacuation day (25 Nov.) 1903.

Murray, William, Earl of Mansfield. See Mansfield, William Murray, Earl of.

Murray, William Henry Harrison, American writer: b. Guilford, Conn., 26 April 1840. He was graduated from Yale in 1862, entered the Congregational ministry the next year and held pastorates in Greenwich and Meriden, Conn. In 1868 he became pastor of Park Street Church, Boston, and from 1869 to 1873 delivered Sunday evening talks in Boston Music Hall to crowded houses. He resigned his charge in 1874 and later left the ministry. He has published 'The Perfect Horse' (1873); 'Adirondack Tales' (1877); 'How Deacon Tubner Kept New Year's' (1887); 'Adventures in the Wilderness'; 'Deacons'; 'Music Hall Sermons'; 'Sermons from Park Street Pulpit'; 'The Doom of Mamelons'; etc.

Murray, William Vans, American diplomat: b. Maryland about 1762; d. Cambridge, Md., 11 Dec. 1803. He received a classical education and after peace was declared in 1783 he went to London and studied law. He returned to the United States in 1785 and established a law practice in Maryland. In 1791–7 he served in Congress where he gained a reputation as a learned and skilful legislator and in 1797 was appointed by Washington minister to the Netherlands. He was envoy to France in 1800 and was chiefly instrumental in concluding the treaty between the United States and that country. He then returned to the ministry at The Hague

and remained there until 1801 when he retired from public life. He published, 'The Constitutions and Laws of the United States.'

Murray, the largest river of Australia, rising in the Australian Alps, its sources being partly in New South Wales, partly in Victoria. It flows for a long distance westward, forming the boundary between these two colonies, then passes into South Australia, where it takes a southern direction, and falls into the Indian Ocean at Encounter Bay, 39 miles southeast of Adelaide, after passing through a large shallow sheet of water called Lake Alexandrina. Its total length is about 1,300 miles. Its chief affluents are the Murrumbidgee and Darling. It is navigable by light draft steamers in the wet season, for the greater part of its course to Albury, 190 miles northeast of Melbourne.

Murray Bay, or **Malbaie,** Canada, a village of Charlevoix County, Quebec, on a bay of the Murray estuary, near the north bank of the Saint Lawrence River, 90 miles east of Quebec. It has lumber industries, and its dependent suburbs, Pointe à Pic and Cap à l'Aigle, at each end of the bay, are popular summer resorts, the surrounding country being very attractive and affording angling, rowing, bathing, and other facilities. Steamboats connect with Quebec. During the Revolutionary War, Murray Bay was a station for United States prisoners of war. Pop. (1901) 826.

Murre, mėr, or **Murrelet,** an auk (q.v.) of the genera *Uria, Cepphus,* and related groups; a guillemot. They are small, black-and-white, web-footed, diving, fish-eating birds, which abound on all rocky northern coasts, breeding on sea-fronting ledges, where each pair produces a single, large, pyriform, variously colored egg, which is not placed in a nest but incubated in turn by the parents, who lift it from the ground upon their webbed toes and warm it between their downy legs. Several diminutive and handsomely ornamented species of the coasts of the North Pacific are called murrelets. Consult: Baird, Brewer and Ridgway, 'North American Water-Birds' (1884); and the writings on arctic ornithology of Fielden, Nelson, Turner, Murdock, etc.

Mur'rine Vases are antique vessels, distinguished for costliness of material and beauty of execution. They were brought by Pompey from Asia to Rome, and bore an immense price. Some antiquarians have supposed them to have been made of a mineral of the class of sardonyx or agate, or of a kind of porcelain or glass.

Murrumbidgee, mŭr-ŭm-bĭd'jē, Australia, a large river of New South Wales, rising in the Gourock Range above Numeralla about 80 miles from the Pacific Ocean. It flows at first northward, but the greater part of its course is westerly; and after receiving the Lachlan from the north, near Nap Nap, it turns toward the south to join the Murray below Balranald. It flows through a fertile and picturesque district, but is navigable only in the wet season. Length about 1,300 miles.

Murshidabad, moor-shē-dā-bād', India, a town and administrative headquarters of a district of Bengal, 116 miles north of Calcutta, on the Bhaghirathi, a branch of the Ganges. It is a straggling collection chiefly of mud houses occupying an extensive area, but has several substantial brick buildings, chief of which are the beautiful Nawab's palace dating from 1837, the imambara and a Moslem mosque. Two miles south of the city is Motijihl or Pearl Lake and the site of the historic palace of Suraj-ud-Dowlah. On the opposite bank of the river connected by a ferry is Azimganj containing the old cemetery of the Nawabs, a mausoleum, mosque, etc. The city is noted for its ivory carving, its embroidery in gold and silver lace, silk weaving, and the manufacture of hookah pipes, and musical instruments. It is still a busy centre of trade but less so than during the 18th century when it was the capital of Bengal and a very populous city, the rise of Calcutta causing its decline. Pop. (1901) 15,168 with Azimganj 28,551.

Musa ibn Nosair, moo'sä ĭb'n nō-sīr', Arabian conqueror: b. Mecca, Arabia, about 660; d. Hedjaz, Arabia, 717. He conquered northern Africa in 699–709 and became its governor in 712. Jealous of the success of Tarik, whom he had sent to conquer Spain, he tried to wrest from Tarik his glory by his own brilliant conquests. This conduct brought upon him the displeasure of the caliph of Damascus who recalled him, stripped him of his honors and caused him to be killed. Other authorities state that he died in extreme poverty. See Burke's 'History of Spain,' Vol. I. (1895).

Musa (moo'sä) **Bay,** a bay formed by the western end of Fuga Island, Philippines (lying north of Luzon) and two small adjacent islands. Although it is well protected from the sea, it is resorted to for shelter only in cases of necessity, as the coral bottom makes anchorage insecure; it is, however, one of the cruising ports of the United States Navy among the outlying island groups of American possessions in the northern part of the Philippine Archipelago.

Musa'ceæ, the banana family, a group in the Order *Scitamineæ,* comprising the largest of herbaceous plants, generally destitute or almost destitute of true stems, yet resembling trees in appearance, and sometimes rivaling palms in stateliness, the long sheathing bases of the leaf-stalks combining to form a false stem. The blade of the leaf has many fine parallel veins proceeding from the mid-rib to the margin. The flowers are congregated on spadices, which are protected by spathes. The fruit is either a 3-valved capsule or fleshy. The species are not numerous; they are natives of warm climates, in which they are widely distributed, and are of great value to the inhabitants of tropical countries; the fruit of some, particularly of the genus *Musa,* being much used for food, while the fibres of the leaves are employed for cordage and for textile purposes (see BANANA; FIBRE).

Musæus, mū-sē'ŭs, in Greek mythology, a poet, seer, and priest, said to have been the son of Eumolpus and Selene, or, according to others, the son and pupil of Orpheus. He was the reputed author of a number of poems, oracles, purificatory verses, hymns, etc., of which we possess but a few fragments, and those of doubtful authenticity. A later Musæus, who flourished about the end of the 5th century A.D., was the author of a beautiful little poem in Greek, entitled 'Hero and Leander.' See HERO.

Musäus, moo-zā'oos, **Johann Karl August,** German author: b. Jena 29 March 1735; d. Weimar 28 Oct. 1787. He studied theology; was master of the pages at the Weimar court, and in 1770 became professor in the Weimar gymnasium. His writings, characterized by humor, simplicity, and kindly satire, include 'Der deutsche Grandison' (The German Grandison); 'Physiognomische Reisen'; 'German Popular Tales' (Volksmärchen der Deutschen), and a series of tales entitled 'Straussfedern' (Ostrich-feathers). Consult 'Life' by Müller (1867).

Mus'cæ Volitan'tes (literally, "floating flies"), in physiology, the name given to certain common phenomena of vision giving the appearance of motes or small bodies floating before the eyes. One class of these specks are a precursor of amaurosis; but another and more common class are quite harmless, and may be seen by anyone under proper conditions. A deranged stomach helps to give them greater prominence.

Mus'cardine. See SILKWORM.

Muscarin, a coal tar color introduced by Durand and Hugenin, and having the empirical formula $C_{18}H_{18}N_2O_2Cl$. It is a brownish violet powder, slightly soluble in cold water, but dissolving readily in hot water with the formation of a violet-blue solution. Powdered zinc decolorizes its aqueous solution, but the color returns upon exposure to air. Muscarin produces a blue color upon cotton that has been mordanted with tannin and tartar emetic.

Muscarine, an alkaloid having the chemical formula $C_5H_{15}NO_2$, and occurring in certain mushrooms, notably in the "fly agaric" (*Agaricus muscarius*). It is also formed in the putrefactive decay of flesh. It may be obtained in the form of deliquescent crystals which are without taste, and insoluble in ether, though readily soluble in water and in alcohol. Solutions of the alkaloid are strongly alkaline, and precipitate ferric and cupric salts in the form of hydrates. Muscarine is exceedingly poisonous. It contracts the pupil of the eye, slows the pulse by prolonging the diastolic state of the heart, and induces salivation, vomiting, intestinal spasms, and general muscular weakness, followed by death. The "fly agaric" takes its name from the fact that flies that alight upon it are killed, either by the muscarine or by another alkaloid, neurine, which the fungus also contains.

Muscat, mŭs-kăt', **Muskat,** or **Maskat,** Arabia, the capital of Oman, on the Gulf of Oman, commanding the entrance to the Persian Gulf. It is a fortified seaport of considerable commercial and strategical importance; the seat of the Imam or Sultan of Muscat; by arrangement has a British political resident; and since 1898 is used as a coaling station by France. Its appearance by no means corresponds with its wealth and importance. Large buildings are few, and the sultan's palace (a plain edifice), the governor's house, and a few minarets, alone rise above the mass of flat-roofed huts or houses. The streets are extremely narrow and its situation at the foot of high cliffs, and nearly surrounded by bare rocks, renders it one of the hottest places in the world. A sufficient supply of water is obtained from wells about 40 feet deep. About three miles distant is the town of Mattrah with docks for building and repairing shipping. As it stands in an open plain, exposed to the sea-breeze, it is cooler than Muscat, so that many of the wealthier merchants of the latter place have their dwellings at Mattrah, and spend only the hours of business in the neighboring city. The combined population of Muscat, Mattrah, and intervening villages, has been variously estimated at 25,000 and at 60,000.

Muscat was occupied by the Portuguese under Albuquerque in 1507. In 1651 it fell again under a Mohammedan ruler. In the latter half of the 18th century it attained, under a ruler who bore the religious title of Imam, considerable importance as a seaport. In 1808 Seid Saïd succeeded to the sovereignty, having assassinated his cousin Bedr. His sovereignty embraced also a stretch on the east coast of Africa, extending from the neighborhood of Cape Delgado northward as far as the equator. In like manner a large portion of the coast of the Persian Gulf acknowledged his sway, so that, including Omán and the African islands Zanzibar, Monfia or Mafia, and Pemba, the coasts ruled by him, for the most part only commercially, could not have had an extent of less than 3,000 miles. In 1840 Seid Saïd removed the court and seat of government from Muscat to Zanzibar, and in 1856 died on the return voyage from a visit paid to the former place. His son Mejed succeeded him as Sultan of Zanzibar and ruler of the African territory, and another son acquired Muscat. Seyyid Toorkee became ruler of Muscat in 1871, and on his death in 1888 a son succeeded him.

Mus'catel, a name given to French and Italian wines, white or red.

Muscatine, mŭs-ka-tēn', Iowa, city, county-seat of Muscatine County; on the Mississippi River, and on the Iowa C., the Chicago, R. I. & P., and the Burlington, C. R. & N. R.R.'s; about 25 miles below Davenport and 140 miles east by south of Des Moines. It is at a bend in the river where the waters change from a westward to a southward current. As usual along the west bank of the Mississippi, the city is on high bluffs which command an extended view of the river. It was first settled in 1833, and in 1839 was incorporated. It is situated in a fertile agricultural region in which there is considerable wood land. Muscatine Island, just below the city, is noted for its watermelons. The chief industries of the city are connected with the manufacturing of foundry and machine-shop products, oatmeal, flour, pickles, brick, tile, boxes, buttons, packing cases, wagons, carriages, pottery, rolling-mill products, canned goods, lead works, and lumber. It has considerable trade in its manufactured articles, farm and dairy products, hogs, lumber, and fruit.

Muscatine has good public and parish schools and several private schools. It has the public Musser Library. It has also several charitable institutions. The government is vested in a mayor, who holds office two years, and a council. The school board, police judge, treasurer, assessor, and wharf master are chosen at a popular election by the people. The waterworks are owned and operated by the city. Pop. (1890) 11,454; (1900) 14,073.

Muschelkalk, mûsh'ĕl-kălk, a German name, signifying shell lime, applied to geological beds of middle Triassic or New Red Sandstone period, occurring in the Alps, in northwestern Germany, Alsace and Lorraine, Swabia, Franconia, Hesse, Thuringia and upper Silesia. The name is due to the many fossil remains of Cephalopods, Encrinites, and Mollusks in general found in the limestone mass of these beds. The Muschelkalk is divided into lower, middle and upper.

Muscle-reading, a form of observation whereby one who is specially trained may, by careful study of muscular movements, interpret many thoughts that are in the minds of others. This is possible because many thoughts are expressed in some manner of muscular action. Thus a person who is told to think steadily, bearing in mind a certain number, unconsciously says that number over and over to himself, making thereby very minute muscular movements of the lips. These can be seen and read by a skilled person, and thus is explained the common trick of many so-called clairvoyants. This tendency of motor expression of mental images is very pronounced in some people. They involuntarily go toward or away from a hidden object, and a blindfold person can often find these objects by carefully noting the degree of muscular resistance or acquiescence in their search for such objects. This parlor trick takes much practice, a quick sense, and much concentration, but does not involve any «thought-transference,» or «mind-reading.» Some people become very skilful in this type of observation, and all may acquire a certain amount of skill by careful watching. Much of the so-called intuition of women is in reality muscle-reading. They are on the lookout for certain forms of muscular reaction, and can thus guess at what is going on in the minds of others. Their constant contact with small children, who characteristically show what they are thinking about, through their muscles of expression, is a school of experience for them. (See EMOTIONS.) Consult: Jastrow, 'American Journal of Psychology,' Vol. IV., p. 398; Preyer, 'Die Erklärung des Gedankenlesens' (1886); and 'Fact and Fancy in Psychology' (1900).

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Muscle-sensation, a loose and vague phrase, otherwise muscle-sense, to express the sum of sensations that come from the joints, skin, muscles, and tendons in the act of making muscular movements. It is also applied to a generalized dull sensation which results from the stimulation of a muscle, either from electrical discharge, or from fatigue following the long-continued stimulation of either a voluntary or involuntary muscle. The perceptions of muscular sense are usually grouped under (1) those of posture; (2) those of passive movement; (3) those of active movement; (4) those of resistance to movement. The muscle-sense is of much importance in imparting information concerning the relative position of the different members of the body, and its loss in this particular (asterognosis) constitutes a valuable symptom in the diagnosis of certain nerve disorders. The muscle-sense is all-important in maintaining bodily equilibrium. Each joint in the body possesses a varying degree of delicacy in this function of equilibrium. Thus the shoulder-joint is considered to be 40 times as delicate in this respect as the joints of the fingers. Angle of bending and speed of movement are both important in the interpretation of these joint-sensations. Muscle-sense in all its bearings has close relations to accuracy and skill in all limb-movements, as seen in marksmanship, ball-playing, billiards, golf, etc., in all sports and games requiring delicate muscular adaptations.

Consult: Henri, 'Année Psychologique,' Vol. V. (1899), with full bibliography; Baldwin, 'Dictionary of Philosophy and Psychology'; Schäfer, 'Physiology' (1900).

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Muscles. The organs called muscles are made up of a collection of muscle-cells, which have for their function the accomplishment of bodily movements. These movements may be gross, as in walking, or very minute, such as take place in the contracting movements of the arteries or veins; they may be voluntary, called into action by willed impulses from the brain, or they may be involuntary and brought about by different stimuli from some part of the central nervous system. The muscular movements necessary in writing are illustrative of the voluntary type; the heart-beat, of the involuntary variety. In point of evolutionary development the involuntary movements may be said to have preceded the voluntary, and hence in regard to complexity of structure the involuntary muscle-cells are simpler than the muscle-cells that perform voluntary movements, and to these two types of cells students of minute anatomy have given the names of unstriped or involuntary muscle, and striped or voluntary muscle. The muscular tissue of the heart is of intermediary character. It is a striped involuntary muscle. Muscle-tissue, like protoplasm, is strongly contractile, but unlike ordinary protoplasm, which can contract in all directions, muscle-substance can contract in only one direction. The simplest type of muscle-substance is seen in many lower animals. In these the muscle-cells are elongated spindles with sharpened ends and with a single elliptical to rod-shaped nucleus, situated about the middle of the fibre. They show a faint longitudinal striation, vary in length from 40 to 500 microns (1-600, 1-50 of an inch) in length, and 3 to 8 microns (1-8000, 1-3000 inch) in diameter. These muscle-cells in man correspond to the unstriped muscle-cells, are bound together in bundles, or flattened plates by an intercellular cement-substance, and are found more particularly in the walls of the intestine, the trachea, bronchi, blood-vessels, bladder, ureter, uterus, in many of the organs of the body, and in glandular structures. They have a rich blood-supply, and a nervous network of sensory terminal filaments, as well as fibres from the sympathetic nervous system. The pains of an intestinal colic, of a gall-stone, of childbirth, are all due to forcible contractions of these involuntary muscle-cells in the respective organs. The more prominent muscles of the body, such as those that move the various bones, the muscles proper, and such as are eaten as roast beef, are of the striped variety. These are a modification of the simple spindle-cells. In man they orig-

inate in the mesoderm (q.v.); muscle-substance commences to form in the interior of some of the cells; these elongate, many nuclei are formed, and the final result is a bundle of much elongated cylindrical cells 12 cm. (2 inches) long and from 10 to 100 microns (1-2500 to 1-250 inch) broad. Each cell is covered by a special sheath, the sarcolemma, and within is made up of very intricate and minutely structured protoplasm, the most striking feature of which is its banded or striated appearance; hence the name striated. Just within the sarcolemma a number of flattened elliptical muscle-nuclei are found. In insects striped muscle-tissue can be studied to best advantage. Occasionally branched forms of striated muscle are found. Blood-vessels are numerous in striped muscle, and lymphatics and nerves are also abundant. Special types of nerve-endings, muscle-plates, are characteristic of voluntary muscle.

Heart-muscle differs from ordinary striped muscle by having shorter oblong cells, which are branched. There is no sarcolemma, and the cells contain but one or two nuclei, which are situated in the centre of the muscle-substance. Blood-vessels, lymphatics, and nerves are plentiful in the heart muscle.

Groups of these muscle-cells, with connective tissues, tendons, and fat, make up the gross muscles of the human body. The voluntary muscles are all attached to bony structures; the involuntary muscles are found in the softer parts. Contraction and expansion are the expressions of their functions, each set of muscles being provided with antagonists, and it is characteristic that in response to pleasure-giving stimuli movements of expansion result, whereas under painful stimuli contraction is marked. Modern psychological theories have been founded on this fundamental principle, emotional states being interpreted as being founded on visceral muscular activities. The forms of external stimuli that can cause muscular action are usually classed as mechanial, chemical, thermal, and electrical. Excess of stimulus brings about a condition of fatigue in muscle. This is accompanied by diminished muscular power, by pain or discomfort, by diminished reflex excitability, and by vague symptoms in the body indicative of some perversion of metabolism.

Muscles are classified in various ways; according to structure or according to their function, or by their positions and situations in the body. For example, some muscles are attached to bones, which they move after the fashion of levers. Such muscles are said to arise or take origin from definite points of bones, and are generally inserted into bones by tendinous prolongations of the muscular substance. The insertion is the moving point, and the origin the fixed point of the muscle. The tendons of muscles vary in length and breadth. They represent inelastic bands of fibrous tissue, the fibres of which insensibly merge into and become continuous with their attached muscular fibres. When the tendinous fibres of muscles become greatly broadened out, so as to form fibrous webs or membranes, which separate or enclose muscles, or which afford extensive surfaces for their attachments, the term aponeuroses is then applied to them. Such aponeurotic expansions are seen in the terminations of the muscles of the abdominal wall, in the scalp, and in other situations. The limit or extent of the action of a muscle is determined by the length of its fibres, whilst its degree of force or strength depends on the number of the fibres. Other muscles are not attached to bones as levers, but on the contrary surround and enclose cavities, which they limit or expand as required. Such hollow muscles are exemplified in the heart and uterus, in the muscular fibres of blood-vessels, in the muscles of the digestive tract, in the iris of the eye, etc.

The nature, mode, and effects of muscular action may be briefly considered in connection with the present subject. The muscles which have the most active functions are those most abundantly nourished. Every action on the part of a living being results in the production of a certain amount of waste material, evinced by perceptible differences in the chemical composition of the tissue. And when it is remembered that the nervous and vascular supply of muscle is also concerned in muscular work and waste, the entire question is seen to assume aspects of a very intricate and complicated nature. Increased exercise of muscles — as seen in gymnastic exercises, or in the exercise of certain trades (for example, the arms of the blacksmith and the lower limbs of the ballet-dancer) — demanding increased nutrition, results in the increased growth of the muscle, and in the formation of new tissue. This result, it is evident, can take place only when the nutrition of the tissue keeps pace with, or slightly outstrips its waste and wear.

The property of contractility distinctive of muscular tissue, and through which its functions are manifested, is generally, though not always or invariably, brought into action through the stimulus of the nervous system, or more widely speaking, through stimuli conveyed to the muscular fibres through the nerves. The subject of the various kinds of muscular actions involves both physiological and mechanical considerations. The voluntary muscles thus constitute moving powers for the bones as levers; and in the living body examples of the three kinds of levers which mechanical science distinguishes are found. In the familiar action of the biceps muscle, which flexes or bends the fore upon the upper arm, is seen an instance of a lever of the third kind, in which the power (represented by the insertion of the muscle on the radius or bone of the fore-arm) is placed between the fulcrum (at the elbow-joint) and the weight (in the hand). The lever of the second order may be illustrated by the raising of the body upon the toes, as in the act of making a step forward in walking. Here the weight (represented by the body pressing on the ankle) is placed between the fulcrum (formed by the fixed toes) and the power represented by the muscles of the calf). The head moving on the spine illustrates a lever of the first order; the fulcrum being represented by the atlas vertebræ, the power by the muscles of the neck, and the weight by the heavier portion of the skull situated in front of the spine. See ANATOMY.

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Muscles, Diseases of. Very little is known of the diseases of muscles themselves. Muscle-tissue, in common with other types of

tissue, undergoes certain forms of degeneration, fatty, mucoid, gelatinous, calcareous, etc., but of the diseases of the muscular tissues themselves there are few well-defined types. The reason for this lack of definite information bearing on diseases of the muscles is largely due to the close relationship that the nervous system bears to the muscular system. This renders it almost impossible to distinguish between a disease of the muscle and a disease of the nerve which is distributed to that muscle. Thus, at the present time, it is held that many of the forms of muscular atrophy and some of the forms of muscular dystrophy are forms of the diseases of the nervous mechanism of the muscle rather than disease of the muscle itself. In former times these were classed as diseases of muscle.

Myositis, simple inflammation of the voluntary muscles, is a form of acute or subacute inflammation in the muscle, due probably to some infectious organism. It is characterized by stiffness of the muscles and with swelling in the muscle-substance. It is usually progressive, the muscles of the body becoming stiff, hard, and fragile, and undergoing fatty degeneration. Myositis is probably a very rare affection, and it is not yet known whether it is a primary or a secondary condition. Ordinary muscular spasms or muscular cramps are in reality localized neuralgias in the muscle, and should be considered as of nervous rather than muscular origin. Lumbago is one of the conspicuous examples of a neuromuscular affection. Myoclonia or Friedrich's disease, and myotonia, or Thomsen's disease, are two forms of disease affecting the muscular system that have certain alliances with hysterical affections, and although regarded by many as of purely muscular origin, there are many reasons for believing that these diseases are of the neuromuscular type. In myotonia the disease usually comes on in childhood; the muscles become stiff, and the children are noted for being clumsy in their movements. The contractions, as in the hand, for instance, commence very slowly and are performed almost automatically, and when the patient desires to loosen his grasp of an object the muscular response is slow, the contraction often persists, or the patient may be scarcely able to open his hand. In much the same manner walking is affected; the patient starts with difficulty; one leg seems to be stiff and halts; but after a few moments of limbering up, as it were, the patient may be able to walk more or less briskly. The disease is chronic, and is possibly of hysterical nature. No treatment is known.

Myoclonia occurs chiefly in patients of bad nervous condition, and consists in clonic contractions of the muscles of the extremities. These contractions somewhat resemble chorea. Associated muscle-groups seem to be involved in myoclonia, whereas in chorea the contractions are extremely irregular. The disease is probably most closely associated with the convulsive tics and is probably due to some affection of the motor cortex. Treatment seems unavailing.

Myositis ossificans is a very rare chronic affection of muscles, during which the muscles become harder and harder, and finally develop bone-like transformations, so that the patient becomes like the ossified man of the circus. As a matter of fact most of these cases drift into museums and circuses. Very little is known as to the cause of the disease, and treatment is unavailing. See NEUROMUSCULAR DISEASES.

Muscogee, mŭs-kō'gē, Ind. Ter., town in the Creek Nation territory; on the Missouri, Kansas & Texas railroad; about 120 miles east by north of Oklahoma. It is in the midst of a fertile agricultural region where some attention is given to cultivating wheat and considerable attention to raising cattle. Its chief trade is in wheat and live-stock. It is the seat of the Henry Kendall College, founded in 1894 under the auspices of the Presbyterians. In 1903 there were in attendance over 200 pupils. The courses lead to the degrees of A.B., B.S., and B.L. Muscogee is the headquarters of the Government Indian Agent. Pop. (1900) 4,254.

Muscogees. See MUSKHOGEAN INDIANS.

Muscovite, or **Common Mica,** a native silicate of aluminum, potassium and hydrogen, occurring in crystals that belong to the monoclinic system, though usually hexagonal or rhombic in general form, and distinguished by the facility with which it may be split into thin laminæ. Muscovite also occurs in massive forms, and in scaly aggregates. It occurs in various colors, and has a lustre that is vitreous or pearly. It is transparent or translucent, with a hardness of from 2 to 2.5, and a specific gravity of from 2.8 to 3. It is a very common mineral, and is an essential constituent of granite, gneiss, and numerous other rocks. The transparent varieties, when obtainable in considerable size, are used for the manufacture of gas-burner chimneys, for covering the windows of stoves and the "peep-holes" of furnaces, and for other purposes where transparency must be combined with infusibility and with a considerable power of resisting the prolonged action of heat. Considerable quantities of it are mined in Bengal and in Switzerland, and fine deposits occur in many parts of the United States. Perfectly transparent plates a yard in diameter are sometimes found at Grafton, N. H., and similar specimens also occur in the western part of North Carolina. Pulverized muscovite is employed in the preparation of certain kinds of paint, and in the manufacture of insulating material for use about electric machinery. Muscovite is not affected by acids, but decomposes upon being fused with the alkaline carbonates. The name "muscovite" is derived from the older popular name "muscovy-glass," which is supposed to refer to the fact that the Russians used it for window-panes. See MICA.

Mus'covy Duck, or **Musk-duck.** See DUCK.

Mus'cular Christianity, a phrase originating with Charles Kingsley (q.v.), to denote robust, healthy, religious feeling which encourages and takes an active part in the harmless and healthy amusements of life, as opposed to a puritanical, ascetic, or contemplative form of religion.

Muscular System, Development of. Two main forms of muscle-tissue (see MUSCLES) exist in the human body, the striated muscle-tissue, which makes up the muscles of the bony framework of the body, and is under control of the brain, and the unstriated muscle-tissue, which is under the control of the sympathetic nervous system. (See NERVOUS SYSTEM.) The

heart-muscle is regarded as an intermediate form, resembling striated muscle-tissue, but in its development more nearly allied to the more primitive unstriated muscle-tissue. Non-striated muscle-tissue is formed by a direct transition of certain cells in the middle germinal layers (see EMBRYOLOGY) or mesenchyme. At first these muscle-fibres are irregularly distributed, but later they are collected into small bundles or into layers, and become associated with the individual organs with which they functionate. Striped muscular tissue develops from the same layer, but the details of development, as is the case in the histogenesis of the heart-muscle, are extremely complicated. The cells at first develop a mesh-like structure or reticulum. This reticulum develops small disks, which later become small columns of muscular tissue. The columns at first develop at the periphery of the cell, and gradually fill in around the nucleus, which in the heart-muscle lies in the centre of the cell, whereas in the muscles of the skeleton the nucleus is pushed to one side, or disappears, new nuclei appearing just beneath the sarcolemma-sheath. The skeletal muscles develop in regular order from the different segments (somites) of the mesoderm. In the early stages the distribution is very symmetrical, but later it becomes extremely ununiform by reason of the irregular welding of different segments of the bony skeleton. There remains, however, a regular association of the muscular myotomes and their embryonic nerve supply, and the homologies of structure may be traced by the nerve-supply, although the muscles themselves may have shifted from their original position. This is a question of highly technical nature, but has many practical bearings in modern medicine. Thus the great broad muscle of the back, the latissimus dorsi, which arises from the seventh and eighth cervical segments, but later migrates and is fastened all the way down the spine as far as the crest of the hip-bone, is supplied by a nerve which also develops from the seventh and eighth cervical nerves. The developmental history of each skeletal muscle can thus be traced by means of its nerve-supply. The whole process is one of extreme intricacy and should be studied in special monographs.

Evolution of Muscular Tissue.— As in the development of the muscular system in man there has been a gradual evolution of the plan of muscular arrangement, so in the animal series there has been a gradual development of a muscular system from the very simplest types of contractile protoplasm. Even in plants definite movements may occur which may be very slow or very rapid. Yet no muscular tissue proper has ever been found in plants. Many of the lowest plants, the *Algæ,* are motile and are provided with vibratory cilia, but these minute hairs, although capable of rapid motion, cannot be regarded as muscular organs. In the contracting protoplasm of the lowest animals, the rhizopods, although movements take place, yet there is no muscle-tissue. Nor is muscle-tissue found in the next higher group, the *Infusoria,* although very actively moving forms are known, for example, the familiar microscopic animal *Paramecium.* The bell-animalcules, *Vorticella, Stentor,* etc., have stalks that coil and uncoil with great rapidity, but they contain no muscle-tissue proper. They do, however, contain what are termed myronemes, and spironemes, which are longitudinally striated and may functionate as muscular organs. In another genus of infusorians (*Bursaria*) there is a contractile band about the body of the animal. It has been regarded as a true sphincter muscle. It has not the structure of the developed unstriped muscle-cell. In the closely allied sponges (*Porifera*) certain elongated cells with rod-shaped nuclei are found, and may be considered the ancestral forms of the unstriped muscle-cell, although it is not until the group of the *Cœlenterates* is reached that true unstriped muscular tissue is present in its more advanced forms. In many of the hydroids a form of external neuromuscular cell is found. This is a type of cell half nerve, half muscle, but not resembling true muscular tissue. In the jellyfishes of this order both neuromuscular tissue and true unstriped muscle-fibres are found. In the sea-anemones unstriped muscle is abundant. It is mostly developed, however, from the external layers of the body, and thus embryologically is not comparable to the muscle-tissue that in practically all the animals higher than the cœlenterates is formed in the middle germinal layers of the developing animal. In one of the higher cœlenterates, the common water-hydra, some muscle-cells are found imbedded in the deeper tissues of the body, thus foreshadowing the higher type of muscular tissue. In the next great family of animals, the *Echinodermata,* to which the sea-urchins, starfishes, and sea-cucumbers belong, unstriped muscular tissue is common, but no evidence of striated or striped muscle is yet present. In the worms the muscular tissue is unstriped and abundant. In the mollusks, the foot of the soft clam, the muscle of the oyster, are made up of unstriped muscle fibres. A higher order, the *Arthropods* or *Crustaceans,* including the crabs, lobsters, etc., contains a well-developed muscular system which is made up of striated muscle, practically the first appearance of this type of muscle in the animal kingdom. In these animals, moreover, there is a type of development of the muscles that anticipates the regular segmented type, metameres or myomeres, of higher animals.

From the crustaceans onward both types of muscle-tissue are found. In the low vertebrates, *selachians* and *fishes,* typical heart-muscle cells, striated and with central-lying nuclei, are found. Consult McMurrich, 'Development of the Human Body,' with full bibliography (1902). See ANATOMY.

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Mus'culus, Wolfgang, German scholar and Protestant theologian: b. Dieuze, Lorraine, 1497; d. Bern 30 Aug. 1563. He entered the Benedictine abbey of Lutzelstein and was ordained priest. He was converted to the Protestant faith by Luther's writings, withdrew from his order in 1527, and in 1531 became pastor of a church at Augsburg. In 1536 he assisted at the Wittenberg assembly, and in 1540 was appointed by the Augsburg senatus a delegate to the ecclesiastical conferences at Worms and Ratisbon. He subsequently became professor of theology at Bern. Among his works are 'Commentarii in Genesin' (1557); and an edition of Polybius.

Muses, goddesses of the liberal arts and sciences; originally nymphs of inspiring fountains. Different accounts are given of their origin. There is also a great difference in their names and attributes. The most celebrated are the daughters of Zeus and Mnemosyne. According to Homer they lived upon Olympus. At first three Muses only were known: Meletē (meditation), Mnēmē (memory, for the immortalizing of great deeds), and Aoidē (song, for the accompaniment of story). Four Muses are sometimes mentioned as the daughters of Zeus and Plusia, namely, Meletē, Aoidē, Archē, and Thelxinoē. At other times they are said to have been seven, at others eight in number. Nine Muses are also enumerated as the daughters of Pierus, king of Emathia; but these are usually held to be different from the nine Muses who ultimately came to be generally recognized in Greece; and although the genuine Muses are sometimes called Pieridæ, they are said to have derived the epithet not from Pierus but the district of Pieria. The names finally recognized as those of the Muses were Clio, Euterpe, Thalia, Melpomene, Terpsichore, Erato, Polyhymnia, Urania, and Calliope. Among the adventures of the Muses their three contests with the Sirens, with the daughters of Pierus, and with the bard Thamyris, in all of which they were victorious, are particularly famous. The customary occupation of the Muses was singing and dancing. Separate attributes were not till a comparatively late period assigned to the individual Muses. Calliope became the Muse of epic poetry. She was the most distinguished among the Muses, the protectress of kings, whom she endowed with eloquence and song. Clio became the Muse of history; Euterpe of lyric poetry and music, particularly of wind-instruments; Thalia of comedy; Melpomene of tragedy; Urania of astronomy; Erato of lyric and erotic poetry; Polyhymnia of the sublime hymn; and Terpsichore of the dance. They are commonly represented as beautiful virgins, adorned with wreaths of palm leaves, laurel, roses, or the feathers of the Sirens. They dance in a circle, together with Apollo, who in later times was styled Musagētēs, or leader of the Muses. Their worship extended from Greece to Italy. In Rome they had a separate temple, and a grove was sacred to them. The swan, the nightingale, and the grasshopper were also sacred to them.

Museum of Art, Metropolitan. See ART, METROPOLITAN MUSEUM OF.

Museums are institutions for the preservation, study and display of natural objects, or of those made by man, while as a sequence of study comes the publication of information thus derived. The word museum originally signified merely a grove or other locality sacred to the Muses, but with the development of the museum the word has undergone a parallel course of evolution until it has come to have its present meaning. The next use of the term was for an institution devoted to the study of philosophy, literature and art, but not including the preservation and display of objects; in this sense it was applied to the famous Museum of Ptolemy Soter at Alexandria. While this was in the nature of a university, there is some reason to believe that collections of plants and animals were attached to the institution, so that it may be regarded as the prototype of the more modern botanical and zoological garden. In the modern sense public museums are of comparatively recent establishment, and as educational factors, of later date than art galleries and libraries, although like these having their beginnings in the gratification of the desires of private individuals. The origin of the art museum is to be found in the collections of statuary, paintings and other works of art, made by kings, nobles and men of wealth; the germs of the modern museum of natural history were the cabinets of miscellaneous curiosities brought together by students, merchants, or men of leisure. Many of these collections subsequently developed into important public museums, the most striking example, and the one most frequently cited, being the British Museum (q.v.), which was the final outgrowth of the cabinet and library of Sir Hans Sloane. In the United States the Museum of Comparative Zoology, at Cambridge, Mass., has grown from the collections made by Louis Agassiz (q.v.) for his own use, until it has become one of the most important museums in this country. Even the United States National Museum, if not the direct outgrowth of a private collection, was indirectly due to the labors of individuals, for its nucleus is to be found in the specimens gathered by the National Institution (later the National Institute), a body organized with the avowed purpose of directing the bequest of James Smithson (q.v.) and engaging in pursuits in accordance with its terms.

The lineal successors of the cabinets of private collectors were the museums of scientific societies where specimens were gathered for purposes of study and display, and while these still exist they have largely given place to museums supported by the state or municipality. Private collections are more numerous than ever, but these are rarely formed with any intention of displaying their contents to the public, although there are some notable exceptions, as in the museum of the Hon. Walter Rothschild at Tring. Ultimately, however, a large proportion of these private collections find their way to public museums through the liberality of their owners.

Another step toward the establishment of public museums was the formation of collections of objects of more or less popular interest and their exhibition to the public on the payment of a fee. Notable examples of these abroad were those of Sir Ashton Lever and Charles Bullock, which flourished in London during the latter portion of the 18th century and first part of the 19th. It is interesting to note that one of the earliest cabinets formed in the United States, that of Mr. Arnold, of Norwalk, Conn., was sold to Sir Ashton Lever, while later on the "Leverian Museum" was sold and its specimens scattered among the great museums of Europe.

Early American Museums.—In this country the principal recent museums of this character were the Boston Museum and Barnum's Museum in New York, in both of which the idea of amusement predominated, the first named being a rather incongruous introduction to a theatre. Both, however, contained some really valuable specimens of natural history and Barnum was among the first to exhibit living fishes. Of a very much earlier date, and more scientific in their aims were the museums conducted by Charles and Rembrandt Peale in Baltimore

and Philadelphia, the latter of which was established in 1785 and from 1822 to 1828 installed in Independence Hall. The modern "dime museum" with its exhibit of "freaks" is a survival of this phase of museum development, and the catalogues of some celebrated old collections will show that they comprised many very similar objects, as well as those of real value from a naturalist's standpoint.

Government Museums.—The final step in the establishment of public museums, the transferral of collections from private to governmental ownership, may be said to date from the founding of the British Museum in 1753. At first admission was by ticket and limited to 30 persons per day; in 1810 the museum was made accessible to the public for three days a week, and not until 1879 was it open to the public daily. The United States National Museum was only formally created in 1876, although so early as 1846 the government possessed collections which were in the custody of the Smithsonian Institution. Exploration has done so much for museums that it may almost be included among the causes that have led to their formation. The colonization of America brought to Europe many examples of new plants and animals, while the Dutch East India voyages did the same for southern Asia, and is is surprising to see how large a number of species from these regions was described by Linnæus and others so early as 1760.

In more recent times the Wilkes Exploring Expedition of 1838–42 and the government surveys for a route for the Pacific railroad had a very decided influence on the origin and growth of the United States National Museum, and there is scarcely an institution that has not been benefited in a similar way. It is but a step from expeditions in which scientific results were subordinate to practical ends to those undertaken solely for scientific purposes, and the systematic exploration of our western Territories for fossils by Yale, Princeton, and other universities, and by such institutions as the American Museum of Natural History and the Carnegie Museum, has become a matter of almost daily news. Another most important factor in the development of museums has been national or international exhibitions. These have had a direct effect in bringing together collections illustrative of natural or industrial resources, and a more indirect influence in stimulating methods of arranging and displaying such material. The London Exhibition of 1851 led to the establishment of the South Kensington (now Victoria and Albert) Museum, and the ethnological museum of the Trocadero was one of the outcomes of the Paris Exposition of 1889. Our own Centennial Exhibition was the direct cause of the erection of a building for the United States National Museum and of the founding of the Pennsylvania Museum of Art, while from the Chicago Exposition came the Field Columbian Museum and the Philadelphia Commercial Museum. Other causes play minor parts in influencing the lines of growth of museums both small and great. Thus the extensive colonial possessions of Great Britain have been largely instrumental in making the vertebrate collections of the British Museum the greatest in the world, while the museum at Leyden is not far behind owing to the former extensive commerce of Holland. In the United States the large deposits of fossil vertebrates in the West, their general accessibility, the imposing appearance of many of the specimens, and the important results to be derived from their study have given a great impetus to the formation of palæontological collections, while special attention has been given to the preparation and exhibition of this class of material. The display of fossil vertebrates in the American Museum of Natural History is unrivaled, and other notable exhibits are to be found in the Museum of Yale University, and in the Carnegie, Field Columbian, and United States National Museums.

Popular Display of Specimens.—What may be termed the popularizing of museums has but recently taken place, and while the display of objects has always been regarded as one of the functions of museums, it is a branch which has received particular attention only during the past 25 years. Originally the larger part of the specimens of birds and mammals were placed on exhibition, but it became evident that this meant the injury or even loss of many, and that the public cared little for large monotonous series of stuffed animals. At present the number of objects on exhibition is relatively small compared with those in the reserve or study series, and there is a very general effort to display at least a part of the specimens amid their natural surroundings. The influence of the private collector has probably had much to do in bringing about this change, and the British Museum, under the administration of Dr. Günther was the first of the great museums to introduce groups of birds, with their natural surroundings, as a part of its exhibition series. These were largely added to under the directorship of Sir William Flower, who took great interest in the problem of rendering museums attractive and instructive, while, following this example, the American Museum of Natural History took the lead in this direction in the United States. To the museum of Leyden, Holland, however, belongs the credit of having before this departed from the tradition that mammals must be stuffed in stiff and formal attitudes and caused some to be mounted that bore some resemblance of life. Change in the character of the exhibits has been accompanied by equal changes in the matter of labeling and to some extent in the publications issued by museums, so that from being merely storehouses of material for the benefit of a few they have become great schools of instruction for the many.

Classification.— Museums may be grouped or classified by their contents, or according to the purposes for which they were established. Following the first method Dr. Goode has divided them into museums of art, history, anthropology, natural history, technology, and commerce. A museum may be established for any of these great subjects as a whole or for one of the many branches into which they may be subdivided. Thus a museum of natural history may comprehend both animals and plants, or one or the other of these primary divisions; it may include the animals of a single continent, a single geographical region or be restricted to those of one locality; it may be devoted to some large group, as mammals, birds, or insects, to some minor division, as birds of prey, butterflies, etc., and may or may not include fossil species. Technology may be greatly subdivided, and while the favorite and more striking subjects are shipbuilding and railroads, there are also museums

of hygiene and textile fabrics, while the United States National Museum contains collections illustrating the development of electrical apparatus. And technology may trespass on art in the matter of ornament, or, like art, be included in a historical collection illustrating the progress of mankind or of one nation.

According to the purposes for which they are founded Dr. Goode distinguishes national museums; local, provincial, or city museums; college and school museums; professional or class museums; and museums or cabinets for special research owned by societies or individuals. This scheme of classification is open to the objection that it confuses purpose with ownership or administration, since, for example, national and municipal museums are not merely for the display of objects found within their boundaries, but for those belonging to the nation or city.

College and school museums have for their immediate purpose the formation of collections that shall aid students in understanding various problems connected with science, technology or art, but they are usually extended beyond this and become more or less general in their character. This has been the case with the museums of Harvard and Yale universities and is notably true of many foreign museums, such as that of the Royal University of Prussia, which is the national museum. The professional museum is for the illustration of some special occupation or line of research such as mining, medicine, or even psychology, which has a museum at Florence founded by Mantegazza. The largest institution of this kind is the Museum of the Royal College of Surgeons, London, which has developed from the private collection of John Hunter.

Modern European Museums.— Europe naturally has the greatest number of governmental museums, the capital of almost every state claiming at least one museum of natural history and an art gallery, and often anthropological and technological collections as well. Paris, with some 30 museums, probably leads in the matter of national collections, while Berlin and Vienna have respectively about 20 and 15 museums. Turkey forms a notable exception to the above statement, for Friedlander's Directory contains no mention of a Turkish museum, although a commercial museum has been established at Constantinople. Great Britain has the largest number of local museums, those devoted to the preservation and display of objects illustrating the natural history and archæology of the immediate vicinity, and, as a whole, these are better administered than those of other countries, great care being devoted to labeling, arranging and otherwise making the collections interesting and instructive to the public.

Modern American Museums.— Including collections of all kinds, there are, according to a list prepared by Dr. A. G. Mayer, 343 museums in the United States, divided according to subjects as follows:

Natural history	233
Science and fine arts	13
Fine arts	34
Industrial arts	6
History	20
Art, history, archæology and ethnology	26

Many of these are, of course, extremely small and it is unfortunately only too probable that many of them are poorly supported and badly cared for, since it often happens that a college may receive an important gift of material without provision for its subsequent care. Omitting the smaller "cabinets" 176 of these museums are attached to schools or colleges, 31 are controlled by societies, 16 are private or municipal institutions and 29 have been established by the Federal government or by States. A very considerable portion of these State museums, however, are connected with agricultural colleges or geological surveys and are limited in their scope, so that the number of institutions adequately representing the resources of the respective States is very small. The State Museum of New York stands first among these, and that of Ohio is important, while the mining industries of various States are well represented.

The Museum of Comparative Zoology, Harvard University, holds the first place among college museums. It is not confined to zoology, as its name might imply, but covers the entire field of natural history. The mineralogical collection dates back to 1793 and is probably the oldest of its kind in America, while the botanical section includes the Gray Herbarium. The nucleus of the Museum of Comparative Zoology was the private cabinet of Louis Agassiz, which was purchased by subscription for $12,000 in 1852. In 1858 an allowance was made for the maintenance of the museum and in 1859 the State of Massachusetts assumed an interest in the institution, at the same time appropriating $100,000 for its increase; $71,000 was also raised by private subscription. In 1876 the State assigned its rights to Harvard College and since that time the museum has been maintained by the university, although the great increase in its collection has been principally due to the liberality of Alexander Agassiz, who has expended over $1,000,000 for that purpose. An important museum of anatomy is attached to the Harvard Medical School. The Museum of Yale University contains the Marsh collection of fossil vertebrates, comprising many types, as well as the largest collection extant of fossil footprints, while brachiopods and sponges are well represented. In other departments are a fine series of modern corals and many rare archæological specimens. The Museum of Princeton University possesses large and important collections of fossil mammals from Patagonia and our western States, a good collection of North American birds and many examples of ancient and modern art. The Museum of Archæology, University of Pennsylvania, has the best collection of Babylonian antiquities in America and is also particularly strong in American archæology; also attached to the university is the Wistar Institute of Anatomy. To Amherst College belongs the Appleton Cabinet of fossil footprints, containing the specimens described by Prof. E. Hitchcock, and the University of Kansas is rich in Cretaceous vertebrates and large North American mammals. On the Pacific coast Stanford University and the University of California both have museums; at present these are working collections, but both have art collections apart from these.

The most important, as well as oldest museums under the control of scientific societies are those of the Academy of Natural Sciences, Philadelphia, and the Boston Society of Natural

History; the first dating from 1812, the latter from 1831, although it was the successor of the Linnæan Society, founded in 1814. Each contains large collections of birds comprising many types of species described by our earlier ornithologists, such as Wilson, Bonaparte, Cassin and Lawrence. The Academy has the largest collection of mollusks in America, and one of the largest in the world, including many types of Tryon, Say and Pilsbry. These two institutions may be looked upon as the predecessors of public, scientifically arranged museums in the United States, the majority of our museums being of very recent origin.

While city or municipal museums are not numerous in this country yet the class includes some of the larger, more important museums in the United States. Most of these have been founded by private citizens but have subsequently received support from city governments either by grants of money, the allotment of land, or the construction of buildings. Chief among them and the largest municipal museum of natural history in the world, is the American Museum of Natural History, New York, incorporated in 1869 as the result of the efforts of the leading members of the New York Lyceum of Natural History whose collections had been destroyed by fire. Other noteworthy museums of this class are the Field Columbian Museum of Chicago, the Carnegie Museum, Pittsburg, and the Milwaukee Museum.

In this category, too, are to be found all the art museums in the United States, not one having been established by the National Government, or that of any State. Local museums are practically lacking in the United States; for most of the smaller museums, even, make the attempt to cover the same ground as the larger institutions when they could achieve much better results by confining their attention to the immediate vicinity. In conclusion it may be said that while public museums are not so numerous in the United States as might be expected from the size, resources and wealth of the country, the last 25 years has not only witnessed a great increase in their number but in the growth and educational efficiency of those already established. For detailed information as to museums and their administration, cases, labels and the arrangement of exhibts, consult 'Museums Association, Report of Proceedings, etc.,' London (1890 to 1900); since that date 'Journal of the Museums Association'; consult Flower for the history of museums, their objects, etc.; 'Essays on Museums and Other Subjects Connected with Natural History' (1898). For the history of the Smithsonian Institution, United States National Museum, classification and administration of museums, 'A Memorial of George Brown Goode.' Report of the United States National Museum for 1897, Part II., Washington, D. C. (1901) 'An Account of the United States National Museum'; Report of the United States National Museum for 1896, pp. 287–327, Washington, D. C. (1898). A brief history of the United States National Museum is contained in the 'Report of the United States National Museum' for the year ending 30 June 1901, pp. 1–47, Washington, D. C. (1903); The American Museum of Natural History is described under the title of 'The Making of a Museum,' by L. P. Gratacap, in the 'Architectural Record' for 1900, pp. 375–402.

A work in three volumes on 'Museums, their History and their Use, with a Bibliography and List of Museums in the United Kingdom,' by Dr. D. Murray, has just been published by James Maclehose & Sons, Glasgow.

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Mush, moosh, Asiatic Turkey, the chief town of the Mush sanjak, vilayet of Bitlis, 79 miles south of Erzerum, near the Kara-su, the eastern affluent of the Euphrates. It is built on a plateau 4,800 feet above sea-level, rising on the south side of a mountain-girt and fertile plain. It is a dirty town, peopled by Turks and Armenian Christians. It has Gregorian and Roman Catholic bishops and an American Protestant mission and schools. A thriving trade is carried on in the tobacco, grape vine, wheat, and other agricultural products of the adjacent plain. Mush is mentioned by Xenophon and Moses of Khorene, and came into prominence in 1894, owing to the massacre of Armenians at Sasun in the neighborhood. Pop. about 20,000.

Mush'room, a popular term loosely applied to many species of higher fungi, especially such as have a cap (pileus) upon an erect stalk. Primarily, the mushroom is *Agaricus campestris* (see FUNGI), the only species cultivated upon a commercial scale. Though more than 700 species of mushrooms have been proved edible within the last half century, and though many others will doubtless be proved harmless, the novice should be cautious in trying new species. Each unfamiliar kind should be subjected to rigid examination first by smell, and malodorous ones discarded; then by taste, a small piece being nibbled but not swallowed. If no ill results follow in the course of several hours, a small piece may be swallowed. If no evil effects follow, but the flavor raw is unpleasant, cooked morsels may be cautiously tried, and results noted. Each individual must decide what species agree with him, because some systems will not endure kinds innocuous to others. Nervous fear of fancied bad symptoms must be controlled, or real illness may be induced by the imagination.

Several species are popularly reputed virulent which do not produce any marked effect upon the health for several hours, and which are widely feared as deadly. Since the two commonest of these (*Amanita muscaria* and *A. phalloides*) are often mistaken for the common mushroom, the novice should never gather any toadstools in the woods under the impression that they are the proper mushroom, which grows in pastures, lawns, etc., and not in shady places. Further, all species with yellow or white gills should be avoided until known to be edible. The common mushroom has pink gills when young, and purplish-brown or black gills when mature.

Several of the thousand species of the genus *Agaricus* are valued for food, but the common mushroom (*A. campestris*) is the most important. It is occasionally found in open and grassy glades; never in the deep forest, but most frequently in old pastures and lawns, especially in autumn, but often when conditions are favorable during the summer. It grows about three

inches tall, has a fleshy cap about three inches broad, generally white, sometimes reddish or brownish above and pink beneath. Its stem does not rise from a cup-like base as does that of *Amanita phalloides*. It is generally gathered in the "button" stage, that is, before the cap has expanded. Among its near relatives the best known is probably the horse mushroom (*A. arvensis*) which is much larger, whiter above, lighter below, the gills being white when young, but otherwise resembling the common species. Other prized edible relatives are: *A. silvicolus*, smooth, yellowish-white, with a long stem growing in the woods; *A. rodmani*, white, short and thick-stemmed, found in hard ground, as in city streets; and *A. fabaceus*, reddish-brown and long-stemmed, with an almond flavor and odor, which grows in greenhouses and on compost heaps. This species has been successfully cultivated.

Success in mushroom growing seems to depend more upon the individual grower than upon the method, since two growers may each succeed equally with very different methods. The essentials seem to be decaying organic matter in abundance, uniform but not excessive moisture, and equable rather low temperature. The most popular places for cultivating this plant are caves, abandoned mines, and quarries, cellars, pits and similar places, where the temperature is naturally suitable or may be artificially controlled. The beds are usually made by spreading a layer of well rotted manure and loam over a firmly packed deep layer of fresh horse-manure. After the violent heat of fermentation has passed and the temperature has fallen to or below 90° F., the mushroom "spawn" is planted. This spawn consists of the mycelium of the fungus in bricks (English) or flakes (French) made of equal parts of horse and cow manure and loam; it is a commercial article and its manufacture constitutes a business distinct from mushroom growing. After sowing, the bed is kept moist by mulching with straw or covering with mats which are replaced in about ten days with a layer of loam about two inches deep. In America the mushroom is rarely cultivated out of doors; in Europe it often is, the temperature and moisture there being more favorable. It is frequently found growing wild as in the vicinity of Petrolea, Ontario, Canada, in sufficient quantities to make commercial shipments profitable.

Besides the species already mentioned, several common American species are among the most desirable edible fungi. *Coprinus comatus*, the horse-tail or shaggy-mane mushroom, grows sometimes six inches tall, has a nearly cylindrical white shaggy cap with often black scales, and white gills when young, but these turn black and liquefy with age. It is commonly found in lawns, waste places, rubbish heaps, etc., from midsummer until the coming of frost, especially after showers. *C. atramentarius*, the ink-cap, resembles the preceding in general appearance and places of growth. *C. micaceus*, the glistening coprinus, is a brownish species smaller than the preceding. It grows upon decaying wood. *Lepiota procera*, the parasol mushroom, and *L. naucina*, the smooth lepiota, grow in lawns, pastures and occasionally in gardens. They have white spores and a ring on the stems, to which the gills are usually not attached. *Cantharellus cibarius*, the chantrelle, grows about three inches tall, measures nearly as much across the cap, has an irregular top-shaped yellow or orange cap, and has much-branched gills. It grows upon the ground in woods. *Marasmius oreades*, the fairy ring, or champignon, is a small cream-colored or reddish species, which tends to grow in circles upon lawns and pastures. It is rather tough and solid, but is valued for its nutty flavor and its drying qualities. Its gills are alternately long and short. *Lactarius deliciosus* has an orange cap, an orange milky juice, and with age shows greenish tints where bruised. Several other related species are highly valued by epicures, for example, *L. volemus*, with a white sweet juice and orange cap; *L. corrugis*, a darker species, even dark brown. *Boletus edulis*, the edible pore-mushroom, has a yellowish or brownish cap, with convex tubes which change with age from white to greenish yellow. It is commonest in chestnut, pine, and oak woods during autumn. *Fistulina hepatica*, the liver-fungus, grows upon decaying wood, is stemless and of irregular form, red, succulent and fibrous. It is often called beefsteak-fungus on account of its edible qualities. *Morchella esculenta* and several relatives, popularly known as morels, are of various colors, but usually grayish or yellowish. The top somewhat resembles honeycomb, which makes them easily recognized. They delight in potash and are common where the land has been burned over or wood-ashes have been thrown; also in orchards and woods. *Lycoperdon giganteum* and other species of puff-balls, which are common in pastures, are considered among the best edible fungi if used while still white. They are more or less globular in form. The species mentioned sometimes attains a diameter of several feet.

Mushrooms are often said to be equal to meat in nutritive qualities, but these statements are not warranted by analysis, which show that fresh mushrooms contain about 88 per cent of water, 3.5 per cent of protein, 6.0 per cent of nitrogen-free extract, and generally less than one per cent each of fat, fibre and ash. The protein content is therefore less than one fifth that of porterhouse steak, less than one third that of dressed codfish, and but little more than one-fourth that of hens' eggs. Indeed, according to analyses, they seem to be inferior to most vegetables. Their chief value is therefore in their flavors, which vary with individual species as much as among higher plants. They are eaten by various animals (see FUNGUS-EATERS).

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Mush'room Gnats. See FUNGUS-EATERS.

Music is the science of combining tones in melodic, rhythmic, and harmonic order, so as to excite the emotions or appeal to the intellect. For untold ages it was purely emotional. With its development as a science, in the Middle Ages, it appealed almost entirely to the intellect, this species of music culminating shortly,

before 1600. At the present time that music is considered best which appeals both to mind and emotion. It is the combination and equipoise of these two factors which causes Beethoven to be considered one of the chief masters, and the music of Wagner, with all its intensity of passion, to appeal to the mental processes by its peculiar treatment of *Leit-motiven.*

Spencer and Huxley suggest imitations of nature (bird-songs, etc.) as a possible commencement of emotional music. Palæolithic man had his music, even instrumental music, as may be deduced from a primitive flute of reindeer's horn, found in a cave which was inhabited during the Stone Age. Many pre-historic horns of metal have been unearthed among the relics of the Bronze Age.

From two or three notes the scale (q.v.) grew into various intricate and widely differing forms. The five-toned (pentatonic) scale is the most primitive now in use among civilized nations. It was chiefly employed by the Chinese, even 4,000 years ago, but is also used in some hymns ('There is a Happy Land' and in many Scottish songs, such as 'Ye Banks and Braes,' or 'Auld Lang Syne').

About 600 B.C. Pythagoras (see PYTHAGORAS) established the proportions of the intervals, and Music, always an artificial and a human product, was given a natural foundation. (See MODE; INTERVAL.) It may be doubted whether harmony existed at all in the ancient world. It is absolutely certain that the Chinese, who were well advanced in the art in ancient days, and who formulated many acoustical principles before the time of Pythagoras, used melody without supporting harmonies. It is possible that the Greeks had a crude accompaniment of drone bass to some of their songs. The Scriptural music, loud and ecstatic, and of an improvisational character, is a blind alley and does not lead to modern development of any kind. The music of both the old and new Testaments was orally transmitted and is not to be traced. Ancient Rome copied the Greek music but without fully understanding it. Rome conquered Greece but could not assimilate its culture, and in the first centuries of our era the musical art was retrogressing. The influence of the Christian Church stayed the decadence and gave a new direction to the art. Ambrose (about 340–398) and Gregory (540–604), stemmed the tide of decay and rescued some part of the ancient systems or modes. The power of music in the early Christian ritual is not only shown by the praises of the Fathers of the Church, but by the fact that the Emperor Julian in 361 endeavored to found a musical conservatory in Alexandria to educate boys to sing in the pagan rites as his adversaries were singing in the Christian churches. The Roman influence now extended the Gregorian chants all over the civilized world. Boethius (475–524) had written a treatise on the Roman system which became the misty text-book of the earliest days (See BOETHIUS). In 790 Pope Adrian sent singing teachers into France with missals illustrating the Gregorian modes. An antiphonarium was left at St. Gallen which still exists and proves the earnestness of the musical mission. The music of this early period, however, is still very vague to us, since no practical notation existed. The musicians of this epoch sometimes employed alphabetical letters as notes (which could be deciphered) but more frequently a system of lines, curves, dots and dashes, called the *Neumes,* which were only to aid the memory of one who had learned the song orally, but meant nothing definite to anyone who had not thus studied it.

A step forward was made by a monk named Hucbald, in St. Amands, who improved the notation somewhat by using a staff (it is very doubtful if he invented it) and by writing certain rules regarding the union of different parts in music simultaneously. The reform seems, at first, to be a very great one, meaning nothing less than the birth of part-music, the evolution of a new science; but, when one knows that these parts were simply consecutive fifths or fourths, or other equally harsh progressions, one can only marvel that the men of the middle ages bore it so patiently. The new system was called the *Organum,* since it was often played upon the great wind instrument which had disappeared when Rome went down, and reappeared in Europe in the reigns of King Pepin and the Emperor Charlemagne.

A much greater reformer than Hucbald came upon the scene about 1000 A.D. Guido, an excellent monk of Arezzo, founded the system of sight-reading, by establishing a vocal scale on the syllables still in use. He found that the hymn to St. John (patron saint of singers) rose step by step from C to the following words,

(C) UT queant laxis,
(D) REsonare fibris,
(E) MIra gestorum
(F) FAmuli tuorum.
(G) SOLve polluti
(A) LAbii reatum,
Sancte Johannes.

causing his choir-boys to memorize the syllables from the melody of their chief hymn, he soon taught them intervals by this simple means, and his treatise "De ignoto cantu" was the first practical mode of singing "an unknown song" (that is, a song unknown before to the singer), in short, the birth of sight-singing. It must be confessed, however, that Guido's claims to this tremendous discovery have been contested, and that every point connected with the rise of the science of music is more or less wrapped in vagueness and doubt.

We come to somewhat firmer ground a little later when notes of definite length are introduced. Franco of Cologne may be credited with the first clear treatise upon such a system (he calls it "Ars Cantus Mensurabilis") in the first half of the 13th century.

And now there came a recession from the evil-sounding fourths and fifths that had existed in the 10th century, and from some equally harsh progressions that were countenanced long after this. The troubadours in France and the minnesingers in Germany had brought forth secular music that broke many of the old rules yet sounded infinitely better than the more "regular" music. The musical canons of the ecclesiastics began to broaden. Marchettus of Padua and Jean de Muris, both in the middle of the 14th century, began to urge new progressions, and the consecutive fifths were tabooed, only to reappear copiously in the most modern works of the 20th century.

It will be impossible in an outline sketch to give all the attempts that were made in evolving the new science, from the 11th to the 14th centuries. Suffice it to say that out of these efforts there grew the first real school of compo-

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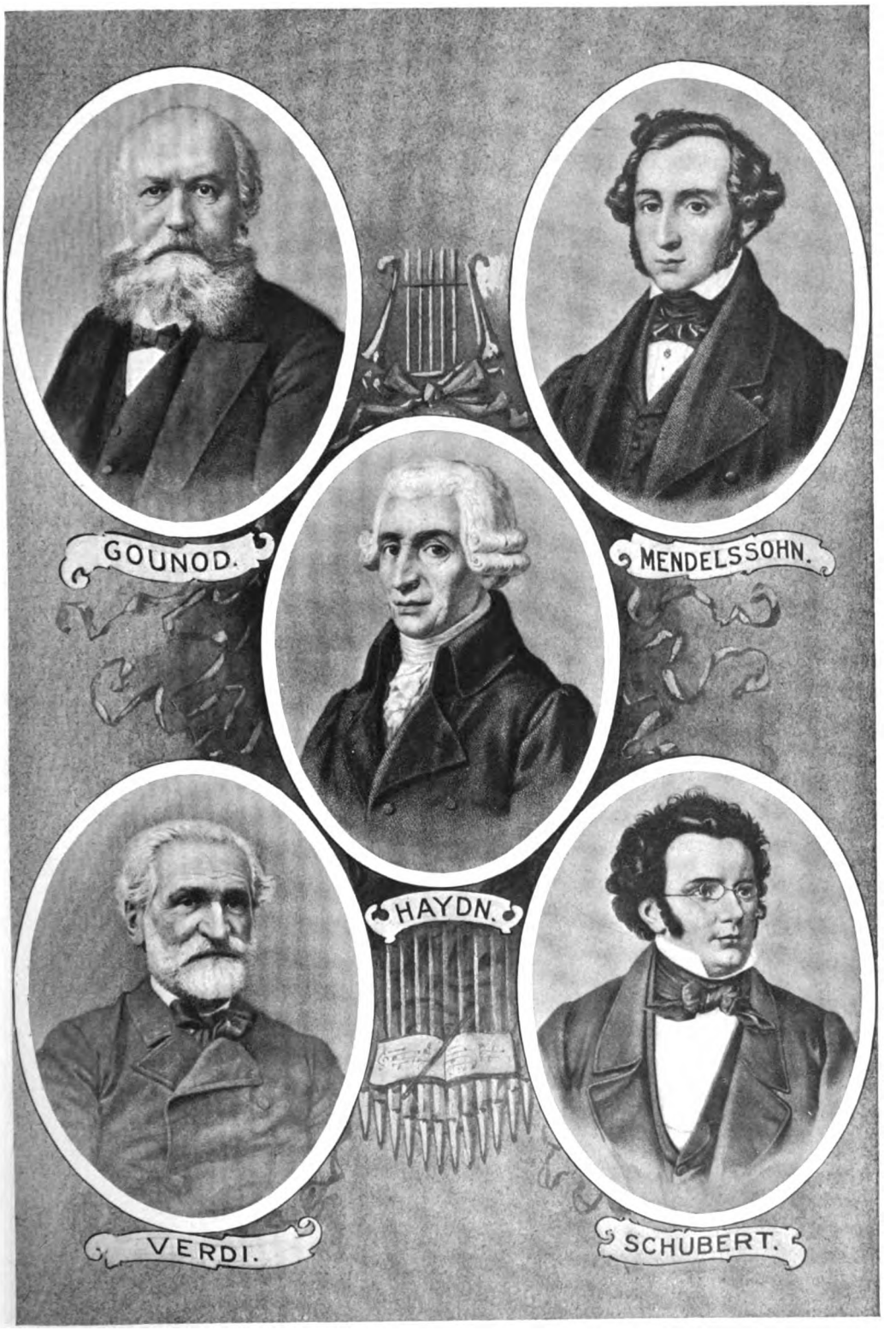

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sition, and instead of its having birth in Rome, it was born in the Netherlands and in Flanders. Yet the Flemish school at once gave its services to the Church, and many of its greatest representatives in its earliest stages went to Rome as servants of the Catholic cause. The Flemish School may be called the true beginning of the science of music, since now, for the first time, a race of composers existed who worked according to definite rules in the production of intricate counterpoint, and were able to impart their knowledge to their pupils. William Dufay was the first of this race of composers. His epoch is mistakenly given in many histories as falling in the 14th century, but the researches of F. X. Haberl have proved that he was born shortly after 1400. He died 27 Nov. 1474. The chief of his contemporaries were Hobrecht, Eloy, Brasart and Binchois, who have, however, left little more than their names, and even of Dufay very little music is extant.

The first great teacher of the school was John Ockeghem, or Ockenheim (about 1430–1513), and among his pupils was the first great composer of that time, practically the first great contrapuntist that the world had ever possessed,—Josquin Des Pres,—whose music Martin Luther delighted in. Des Pres was born about 1440 and died either in 1515 or 1521. Other pupils of Ockeghem were De la Rue, Brumel and Agricola. All the music of the foregoing composers was purely intellectual, but with Des Pres we find the first glimmerings of emotion mingled with the musical mathematics, and he taught that dissonances could be used to express passionate feeling.

The greatest figure in the Flemish school, however, is Orlando Di Lasso (1520–94), who composed works which are beautiful even to modern ears. The Flemish school ended with this culmination. It had existed about two centuries and in that time it had brought forth the science of composition and some 300 composers.

There was, however, another country which helped greatly in this result. The first musical dictionary ever written, by John Tinctor (1476), gives the credit of the invention of counterpoint to the English, and a manuscript of a canon for six voices, in the British Museum, would seem to show that there were very skilful composers in England as early as the 13th century. This canon ("Sumer is icumen in") ascribed by some to John of Reading, in 1250, by others to a much earlier date, is a surprisingly advanced work for its epoch. A mysterious figure looms up as an English contemporary of Dufay, in John Dunstable, but of the music of this Englishman (who died about 1458) very little is known, only a few fragments remaining.

Contemporaneous with the later Flemish writers one finds a few Italian composers forming a school of their own. The first of the old Italian school was Costanza Festa, a Florentine, who died in 1545. But the one great master in this field was Palestrina (born probably in 1524—there is much doubt about the date of birth,—and died 1594), who was without doubt the greatest composer up to that time. He combined the Flemish ingenuity with a lofty dignity and sometimes (as in his 'Improperia') with emotional power.

The year 1594 was an epoch year in music. The Flemish school ended in that year, with Di Lasso's death; the Italian school lost its chief master in Palestrina; a revulsion against the intellectuality of music took place,—and the first opera was written.

We pause here, therefore, to sum up a few other points in musical evolution that had preceded this important date.

Although the chief scientific music of the world had been ecclesiastical up to this point, the troubadours in France, and the minnesingers in Germany, had turned the attention of cultured minds to the beauties of secular singing. Instrumental music was as yet a Cinderella among the arts. The strolling jongleurs and wandering minstrels amused the people, and sometimes the nobility, with displays of skill upon various instruments, combined with juggling tricks. They were generally under the ban of the law and led a very precarious existence.

One of the trouvères of France,—Adam de la Halle,—in the latter half of the 13th century, had written a musical play, entitled 'Robin et Marion,' which was the precursor of light opera. It is the earliest popular work of which we have any record, but it was written by ear, and not by any teachable rules. Venice, partly through the efforts of Flemings, partly through Italian influence, had become a centre of organ-playing. Adrian Willaert (1480–1562), a Fleming, had become organist of St. Mark's in Venice and drew many pupils thither, among them Di Rore, Zarlino, and Andrea Gabrieli. The last-named taught his nephew, Giovanni Gabrieli, who became one of the noblest composers of the Venetian school. He was born in 1557 and died in 1613. Zarlino taught many German pupils, and through the Venetian school of organ-playing, Germany for the first time came in close musical touch with Italy. Zarlino taught Scheidt, Praetorius and Schiedemann, while the elder Gabrieli had Hans Leo Hassler as a pupil. Zarlino and Willaert were the first to agitate for a tempering of the musical scale (see TEMPERAMENT), but its establishment came much later through the wisdom of Bach.

Claudio Merulo (1533–1604) established the organ toccata, probably the earliest form of technical instrumental display in the modern sense. One other form of scientific secular music had arisen, thanks to the Netherlanders; the madrigal, an unaccompanied vocal composition displaying the most intricate counterpoint had come into vogue, and Willaert and Di Lasso had achieved triumphs in this school. Luca Marenzio (1556–99) had also done good work in this field. But the most charming madrigal composers were to be found in England, where this style of singing met with especial favor. It is customary to vaunt the glory of the Elizabethan poets, but if the tremendous name of Shakespeare be eliminated, the excellence of the contrapuntists at this time rivals that of their literary brethren. Tallis, Weelkes, Wilbye, Morley, Farrant, Byrd, Bull, Ford, etc., may well be cited as balancing Beaumont, Fletcher, Massinger, Marlowe, Jonson etc.

Music-printing (see PRINTING) had also been established, in 1502, by Petrucci of Fossombrone, and caused the compositions of all these men to spread from country to country with great rapidity.

The change from the old school of pure counterpoint to a more emotional style, from intricate choral works to solos both vocal and

instrumental, had its first practical demonstration in 1594 (some place the date two years later), by the composition and performance of the first opera, entitled 'Daphne.' The work was the outcome of the efforts of a coterie of cultivated amateurs who began their meetings in Florence, and endeavored to bring into music something of what they supposed it to have possessed in ancient Greece. The men who were active in this movement, which caused the renascence of music, were Giovanni Bardi (Count Vernio), Vincenzo Galilei, Strozzi, Mei, Rinuccini, Caccini, and Peri. Their first opera met with great success, but their second,—'Euridice' — was an epoch-making work, since it contained in embryo an entirely new mode of musical treatment. Counterpoint was replaced by monody, and recitative allowed musical declamation to take the place of intricate tonal construction. The libretto was the work of Rinuccini, while the music was written by Peri and Caccini in two versions, that of the former being the better.

The new school spread quickly to all countries, only in France its progress was checked by the power of Lulli, who devoted himself chiefly to ballet-music. The latter was largely introduced into Molière's plays and obtained the favor of Louis XIV., who sometimes appeared himself in the dances.

The opera was not the only form of the period of phenomenal musical activity which marked the closing of the 16th century and the beginning of the 17th. The oratorio also had its beginning in this wonderful era. Filippo Neri (1515–95), who has since been canonized by the church, was an enthusiast in the matter of good church music and at his church in Rome he frequently had spiritual meetings, apart from the regular services, in which he portrayed Scriptural subjects in the shape of musical plays. His friend Palestrina often assisted in this pious work, and may have had a hand in the development of the great sacred form. As these entertainment did not take place in the body of the church, but in the Oratory (Oratorio), the origin of the name of this form will readily be seen.

But the real establishment of the form came with Emilio del Cavaliere (1550–98), who wrote a large work in the new style, entitled 'L'Anima e Corpo.' This was first performed in 1600, probably in the church where Neri had labored, and was given upon a stage, with costume and action, exactly as if it were an opera. Although both Neri and Cavaliere were dead, such minute directions were left regarding the mode of presenting the work that one may presume that the intentions of the composer were thoroughly carried out. This first oratorio was so entirely in the new school of monody and declamation that one may doubt as to whether the establishment of opera is not in a large degree to be credited to Del Cavaliere.

Besides the opera and oratorio, instrumental forms were established at this time as well. Dancing is the mother of instrumental form. The dances of Spain had gradually made their way into France and exerted a strong influence upon classical music. In an effort to obtain contrasts several of these were joined together in one large composition, which was at first called a partita, but afterward became a suite.

Free instrumental forms also sprang from the organ toccatas already alluded to. Frescobaldi (1588–1653) was to Rome what Willaert had been to Venice half a century before. Frescobaldi has been called the father of true organ-playing. He improved the toccata and called it *sonata* (a sounding-piece,— that is, an instrumental piece), to distinguish it from the *cantata,* — the singing piece. Corelli (1653–1713) gave to the old sonata a form, which, although much less important than the later, classical shape, had yet within itself the elements of the noble form. Its first movement was a large three-division shape, exposition, development and recapitulation; and this led to the *Sonata-Allegro,* the first movement-form of the classical symphonies and sonatas, the form of many noble overtures.

Amid all these remarkable advances the fugue remained rigid and lifeless, a survival of the old intellectual problem-music. As yet the fugue was little more than a canon, a continuous imitation of a given melody. It waited its liberator — Bach.

During the century which followed we find Italy combining contrapuntal skill with the less educated enthusiasm which marked the early operas, and such men as Monteverde (1568–1643) and eventually Alessandro Scarlatti (1659–1725) make of the new school something far better than its founders had dreamed of. Stradella, Carissimi, Lotti, and Rossi added to the advance of the great new school which was to cause Italy to be just called the "Mother of Music." The school was established in England too by Henry Purcell (1658–95), who even introduced the Italian musical signs and expression-marks into his native country. Purcell, who was the greatest musical genius that England ever produced, founded his own English operas upon the Italian models, but his works had characteristics entirely their own and extend all the way from the melody of 'Lilliburlero' (the revolutionary song of 1688) to the loftiest anthems and brightest operas.

In France the great Lulli (1633–87) was bringing forth the most dainty and graceful ballets. In Germany Reinhard Keiser (1673–1739) began the 18th century by endeavoring to form a German school of opera, but the Italian operas soon resumed their sway.

In Germany, also, the effect of the numerous students who had gone down to Venice in the 16th century and the beginning of the 17th, was beginning to make itself felt. Luther's influence had established the chorale as a sturdy root whence much sacred music was to grow. Perhaps the three men who most helped the growth of Germany's sacred music in its earliest post-Lutheran stages were the "three Ss,"— Schutz (1585–1672), Scheidt (1587–1654), and Schein (1586–1630), who not only helped Italian music in the Fatherland, but elevated the style of organ-playing far above anything that Italy had done. Musical settings of the Passion began to appear in Germany, and the oratorio took a nobler path than in Italy, even before the appearance of Bach and Handel. To Germany also was due the new arrangement of part music, which took the melody out of the tenor voice, where it had always been in the Flemish and old Italian music, and placed it in the soprano, a change due to the chorale-singing of the 16th and 17th centuries.

Out of the great musical epoch at the beginning of the 17th century there came also a radical change of notation. The notation of Franco of Cologne had been improved by the invention of many additional rhythms and the employment of smaller notes. In the music of Palestrina and of Orlando di Lasso, that is to say up to 1594, one finds some half-dozen tonalities (keys) employed, and notes and rests down to 16ths. But one does not yet discover a rational division of music into measures. This great advance came shortly after 1600, with the new monody, the declamatory music of the early operas, and with this came also, for the first time, the use of terms of tempo and of expression. Even the grouping of notes was invented in the latter part of the 17th century, so that this epoch saw the establishment of the greater part of our present notation system. Music of the better class, printed after 1700, is without any very important difference from that printed to-day.

And now the procession of the tone-masters who are prized by the modern world begins. Bach (1685–1750) and Handel (1685–1759) were so exactly contemporaneous that many speak of them as if they had been the Siamese twins of music. Yet their influence was very divergent. Bach leaned toward the old school of pure counterpoint; Handel was impelled toward modern dramatic effects. They faced different ways. Handel led toward orchestral experiments and was more directly melodic than Bach. We owe to him the noblest form of oratorio, which, by the way, he did not attempt seriously until past his fiftieth year.

To Bach we owe debts far more varied and even greater. He reconciled the old diatonic style of composition with the newer more modulatory school; by his great organ works and his clavichord fugues he founded modern technique; he was the father of the best school of organ-playing; he composed the greatest mass (that in B minor) which the world possesses, and also the noblest Passion music; and he was absolutely the inventor of freedom of modulation. Before his time, by what was called "mean temperament," it was possible to modulate into some three or four major and minor keys. Bach in 1722 gave to the world the first book of his "Well-tempered Clavichord," the composer's declaration of independence—"We hold that all keys are created free and equal!" (See TEMPERAMENT.) In 1740 he wrote the second book, riveting the great reform.

Opera in the meantime had lost its opening splendor. Intoxicated by the success of the new style of music the composers began to believe that poetry was a secondary matter in the wedding of the arts, and in allowing their music to pursue an independent path all dramatic purport was soon lost. A reformer was needed and he soon came. Gluck (1714–87) began a crusade against the meaningless character of many of the beautiful melodies of the Italian Opera. In 1776 his opera of 'Orpheus' (which still holds the stage) began the dramatic school of operatic music. Beethoven followed in this path, and Mozart managed to reconcile melodic grace and dramatic content.

In carrying this sketch to its conclusion we must now trace three intertwining paths—piano music, orchestral music, and operatic and other vocal music. Naturally we shall be able to allude only to epoch-making composers.

In 1709 Cristofori, an Italian, invented the pianoforte. The instrument was at first neglected. Bach thought it fit only for rondos. Mozart used the spinet, as did Haydn. It was Beethoven who first turned the tide toward the new instrument. Instrumental technique grew up in the train of the new invention. Domenico Scarlatti (1683–1757) led toward a piano style while writing for the spinet. In 1752 Philipp Em. Bach published the first valuable book of technique, which could be applied to the piano, to the clavichord, or the spinet.

The classical piano sonata grew gradually from a combination of the ideas of the suite and of the first movement of the old sonata as established by Corelli. Haydn first established it, Mozart improved it, and Beethoven brought it to its culmination. The symphony was but a larger form of sonata, for orchestra, and the same process of evolution took place. Seldom has a form reached its zenith more quickly; from the first symphony, composed by Haydn (in three movements and for eight instruments only) in 1769, to the tremendous ninth symphony of Beethoven, composed in 1824, is but 55 years, yet these years contain all that is pertinent to the birth, growth and climax of every form of sonata,—in which we include classical chamber music, string quartettes, quintettes, etc., and orchestral works such as symphonies and concertos.

Just as there was a most significant musical epoch from about 1590 to 1620, so we find the "classical period" from about 1775 to 1825 to present not only a marvelous amount of creative energy, but a change in the musical taste of the world, a transformation of the scope and style of music. Only the opera went on its uninterrupted path. Yet here, too, there were some changes.

Beethoven (1770–1827) was an instrumental, an orchestral composer, par excellence. His one opera, 'Fidelio,' great art-work though it was, exerted no especial influence upon any school of composition. Mozart (1756–91) improved the style of the Italians in opera, but did not actually strike out a new path. His 'Don Giovanni,' for a long time the masterpiece of the world in the operatic form, was but a culmination of what Italy had already attempted. Rossini (1792–1868) with a pernicious habit of creating the most beautiful melodies whether they fitted the text or not, set back the hands of the clock of musical progress, as far as opera was concerned, for a good half-century.

The first ringing note of the newer and truer school of dramatic opera was heard when Von Weber (1786–1826) in 1820 completed his 'Freischütz,' an opera built upon the sure foundation of the folk-song, dramatic and thoroughly wedding its poetry and music.

The sacred forms, during the classical epoch, did not change materially. Beethoven wrote a most intricate mass, but it was only an echo of Bach with his great polyphonic B minor mass. Mozart composed, almost upon his death-bed, a noble requiem, but it was only an addition of operatic flavor to the requiems that had preceded. Cherubini (1760–1842) wrote a couple of requiems that were as great as any of the school—but were not in any sense innovations.

Piano and orchestral works advanced the most in the classical half-century. The vastest

piano-work existing today is probably Beethoven's B flat sonata, Op. 106.

The orchestra, in the modern sense, had its birth in the classical half-century. Bach and Handel made only outline sketches of their orchestral works, leaving much for modern commentators to fill in. But when Haydn came to England, in 1791, he directed a complete orchestra and he published complete orchestral scores, an epoch in the history of orchestral development. Mozart had, however, before this time, written a large number of symphonies in complete score, many of which were published at a later period. Although the modern orchestra and the full score had their origin in this remarkable epoch, the art of conducting came later. Mendelssohn and Berlioz may be named as the first really great conductors in the modern definition of the word. The use of the baton in conducting only became established after 1800.

One other important evolution must be added to the work of the 50 years which form such a golden epoch of musical creation. The songs of Europe, such as had any real worth, were almost altogether folk-songs, melodies which grew up as the briar rose by the way-side of art, not the careful product of great composers, but the spontaneous voice of the people. The songs of the composers were generally dull and artificial things, made so, perhaps, by the fact that the poets were not concerning themselves with short and lyrical forms. But when Goethe and Heine, in Germany, began writing beautiful lyrical poems, the song-composer was sure to follow soon. Franz Schubert (1797–1828) was the genius who evolved the 'Lied,' the artistic song which, however short, was yet a complete and perfect whole; as a tiny Meissonier painting is as perfect in its way as the largest canvas. Schubert added glorious works to the symphonic repertoire, his piano-works practically founded the "Minuet-form," yet he thought vocally, and his most spontaneous and most important works we consider to be his 'Lieder,' which songs began a new school. There are, however, a few authorities who consider Schubert greatest in his orchestral works and influence.

We may now follow the three distinct musical paths,—Vocal forms (including opera), piano music and orchestral music,—each by itself, to the present time. Continuing the song development, we find Schumann (1810–56), and Robert Franz (1815–92) following in the footsteps of Schubert and bringing the miniature vocal form to perfection. The operatic form took a wide deviation.

The work of Rossini was baleful only in the fact that it paid no heed to the wedding of words and music in dramatic unity. In light operas Rossini was a model, and his 'Barber of Seville' is a masterpiece. Once and once only, he proved that he could write a truly dramatic opera, and produced 'William Tell.' Donizetti (1797–1848), Bellini (1802–35), etc., followed his lead and wrote charmingly, but untruthfully. France compromised and united prettiness and some degree of dramatic feeling in the works of Gounod (1818–93), and of Ambroise Thomas (1811–96). The real reform, however, in this mesalliance of Poetry and Music was made by Richard Wagner (1813–83).

Wagner's combat and triumph have been too recent to require detail here. We need only state that his theories of opera, or "music-drama" as he preferred to call it, were,—

1. The abolition of a set form (that is, ending as one began), and the use of any shape that the poem suggested.

2. Absolute unity of the entire work. No division into songs, duets, choruses, with applause between and sometimes even encores. Continuity from beginning to end.

3. The music is always to interpret the poetry. Its entire character is to be dictated by the words: "Music is Truth." "In the wedding of the arts Poetry is the man, Music the woman"; "Poetry must lead, Music must follow"; "Music is the handmaid of Poetry"; are a few of Wagner's apothegms.

4. Abolition of mere tune and the substitution of a melodic recitative, called the "Melos."

5. Absolute freedom of modulation. Not necessarily a fixed tonality to any work or part of it. "Swimming in a sea of tone."

6. Excellence of libretto. No book is fit to be used for the text of an opera unless it would make a successful drama by itself.

7. A constant use of the Leit-motif (a musical figure expressing a definite meaning) by which the orchestra speaks a language that can be comprehended, somewhat like the chorus used to do in the old Greek tragedies. (See LEIT-MOTIF.)

These are not all of the theories that Wagner evolved, but they are the most important. They did not spring into being at once. One sees a few of them in 'Tannhäuser,' more in 'Lohengrin,' but the fulness of his reforms is first revealed in 'Tristan und Isolde.'

Wagner's work has influenced all the modern opera composers. Verdi (1813–1901) had begun his career in Italy almost upon the lines of his predecessors. Thanks to his genius he soon began to carve out a better vein for himself. In his 'Aida' he began to lead Italy to a much finer and truer school of opera than it had ever possessed. In 'Otello' and 'Falstaff' while carefully discarding the "Leit-motif" he seems to arrive at almost all the other Wagnerian conclusions, although his Italian personality prevents any great resemblance in results. In France, Bizet (1838–75), the best of French operatic composers, was starting upon a similar path with 'Carmen' when death interruped his career. America has as yet produced no standard operas, although Paine's 'Azara' and Chadwick's 'Judith' are worthy to become permanent additions to the repertoire.

Tracing the piano path from the time of Beethoven, we find three great "Cs" in technical writing—Czerny (1791–1857), Clementi (1752–1832), and Cramer (1771–1858). These led to a modern technique and this bore fruit in two different directions. Liszt (1811–86) became the king of the piano and brought its technical power to a point that had never been suspected before his time. Chopin (1809–49) came as the poet of the piano and gave to the instrument its most beautiful phases of expression. A host of piano composers have sprung up in every civilized country, Russia furnishing a great number.

In connection with the rise of technique we may speak of the advance in other branches of music. Italy had great singing schools in the 18th century, and some of the most famous vocal teachers. Nicolo Porpora (1686–1766) was the most eminent of these, and had as pupils some of the most renowned singers of his day, among them Farinelli (Carlo Broschi) who was reputed to be unrivaled in flexibility and in power. Pistocchi was another of the famous teachers of this epoch and his most famous pupil,—Senesino,—disputed the palm even with

Farinelli, in England in Handel's time. Vocal technique could scarcely go further than it advanced in the 18th century, although the 19th furnished such singers as Catalani, Malibran, Mario, Rubini, Lablache, Jenny Lind, and later such artists as Jean De Reszke, Adelina Patti, and, in the dramatic school, Materna, Tietjens, etc.

In violin technique the chief advance was begun in the 17th century, when Corelli (1653–1713) was the most prominent teacher of Italy. At about this time, too, the golden period of violin making began and the Amatis, Stradivarius and the Guarnerii made the name of Cremona famous all over the world. The king of all violinists, speaking entirely from the standpoint of virtuosity, was Paganini (1784–1840) who advanced technique so far that even to-day the greatest living violinists are unable to conquer all of the difficulties which he left as a legacy to the world. Since his time the sceptre has passed to Joachim (1831—), who held it for many years, but now, in his old age, sees it contended for by a host of advanced players. Paganini influenced violin music toward mere virtuosity, while such players as Joachim, Wilhelmj, or Wieniawski combine musical feeling with technique in their work.

Orchestral development has been absolutely phenomenal since Beethoven made his developments in tone-coloring. Berlioz (1803–69) was the first to advance upon the great pioneer's work and achieved remarkable results by his various experiments with new combinations. Wagner carried the art of orchestration still higher in his operas, and since his death a whole host of great tone-colorists have arisen. Russia has contributed very much to this advance, and it is not an absurd prophecy to predict that the Slav may attain the orchestral supremacy of the world in the near future. Tschaikowsky (1840–93) appears to be the greatest genius in this field that Russia has yet produced.

France has done much in recent times in this direction both in purely orchestral works and in combination with voices in cantatas and operas. César Franck (1822–90) led the reform in that country and, thanks chiefly to him, a race of very modern music-thinkers has arisen in France. Massenet, Saint Saens, D'Indy, Charpentier, Chaminade, and many others are writing in various fields of music, almost all tending to develop the orchestral side in some way. There is much freedom of form in the neo-Gallic school.

Italy has done very little in this direction, Sgambati being her only symphonist of prominence, but the neo-Italians, Mascagni, Puccini, Leoncavallo, etc., are laying great stress upon their orchestral work in opera.

Germany has developed chiefly along the Wagnerian lines, not an unmixed blessing when applied to purely orchestral work. After Beethoven there came a degree of dulness in orchestral matters. Mendelssohn (1809–47) developed the symphony along the classical lines, but while one must pay cordial tribute to the symmetry, skill, and melodic character of Mendelssohn's work, he was not of the stuff of which epoch men are made.

It was Schumann who made the first remonstrance against following too slavishly the classical paths, and through him the Romantic school and the freer mode of sonata treatment had its birth.

There are many who desire us to believe that the sonata form and all classical orchestral forms have had their day, but the great work of Brahms (1833–97) in symphony and sonata stands as a refutation to this dictum.

Nevertheless the modern tendency is toward greater freedom than ever before, both in form and in harmonic combinations. Liszt began this movement, and the time will come when it will be seen that his orchestral works were scarcely less influential than his piano compositions. He has led toward great brilliancy of tone-coloring, and, in his 'Poèmes Symphoniques,' to freedom of form and to intense dramatic expression. In England, Edward William Elgar (1857) has broken the bonds of Handelian tradition in oratorio by his Wagnerian orchestral, solo, and choral treatment of 'The Dream of Gerontius' and other sacred cantatas. Richard Strauss (1864—) has led the orchestra into the most difficult paths that it has ever trodden. He is not only the greatest master of orchestration at the present time, but he has endeavored to extend the boundaries of orchestral expression, using metaphysical subjects freely and pushing programme-music (instrumental music which gives definite pictures) to the extreme limit.

America has brought forth a school of orchestral writers of which John K. Paine (1839—), George W. Chadwick (1854), and E. A. MacDowell (1861—), are the foremost, while Horatio Parker (1863—) has brought the American oratorio to a much higher standard than it has ever before occupied.

What the future may bring is difficult to prophesy. Music has changed so constantly and so entirely, from epoch to epoch, that it is folly to imagine that there will be no further changes. In 1722 Rameau, the French composer, declared that music had been worn utterly threadbare, that all the possibilities of tonal expression had been exhausted! Yet almost all the great composers came after that time!

We cannot believe that the world will ever recede from the great orchestral virtuosity it has attained, but we may imagine that a return may be made, if not to form, at least to melodic beauty. A combination of attractive melody with rich and impressive harmony, a perfect balance of the intellectual and the emotional sides of the art,— these may be characteristics of the Music of the Future.

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Music-box. See MUSICAL INSTRUMENTS, MECHANICAL.

Musical Drama. See DRAMA; MUSIC.

Musical Festival, a series of performances with large choral and orchestral auxiliaries usually held in large cities yearly or bi-yearly. The first known of these festivals was the great Handel Commemoration (1784-7). Festival performances of Handel's oratorios were given in Berlin and other continental cities. In the United States the better known entertainments of this kind are the Cincinnati Musical Festival and the Worcester, Mass., Festival. See ORATORIO.

Musical Instruments, Mechanical. From the earliest times men were able to produce harmonious musical tones by automatic or mechanical means. The hanging gardens of Babylonia were fitted with various wind harps, which produced a soothing melody in a minor key. The inventive Greeks had many instruments which could produce harmony in a limited scale through the action of the wind (Æolian harps) or by water dropping upon differently tuned vessels. But it was not until the development of the harpsichord into the now common pianoforte that rapid strides were made in this industry. The patient workmen of Switzerland first constructed music-boxes in the middle of the 18th century by fitting minute plugs on a brass or metal cylinder, so arranged that they would strike separate bars of steel and vibrate them, thus producing the proper musical tones to form harmony. This same principle is still in use, although some of these German and Swiss music-boxes are quite elaborate and can play intricate compositions. The motive power is usually a spring, which, when wound up, causes the cylinder to revolve and the pins to strike the tone bars and vibrate them.

During the last decade of the 19th century and the beginning of the 20th, wonderful improvements have been made. The tediousness of learning to play the piano properly may have been the incentive for this activity, for it is now possible to attach to any ordinary piano a simple apparatus which will play perfectly any composition which the human hands could produce, rivaling in technique, expression and brilliancy the efforts of the most celebrated piano performers of the world to-day. Many American firms are now engaged in the manufacture of these attachments for the piano. In 1880 the first really successful mechanical player was invented and called the «æolian.» This name has clung to all the succeeding inventions along this line. The first æolian was applied to the melodeon, a flat reed instrument operated by a bellows, which forced wind through the reeds, downward, thus producing harmonious sound. As the melodeon and organ each require no delicacy in the touch to produce music, this first æolian was a comparatively simple piece of mechanism. The basic principle was the perforation of a roll of tough, strong paper, the perforations allowing air to pass through them as desired, this stream of released air in turn operating a felt-tipped finger, which pressed down upon the organ's key, or opened a valve. The size of this perforation in the paper gauged the length of time which elapsed before the finger was released and the sound emanating from that particular key stopped.

The operator of one of these attachments for the organ sat before the instrument, as in ordinary playing, and pumped with his feet on a bellows. This bellows not only filled the air chamber of the organ with air, but also operated the wind motor of the æolian. As the motor pumped air into the attachment, it was held in a chamber ready to be emitted when the perforated paper passed over the holes in the roof of the chamber. As a note was wanted, a perforation made in the paper over the corresponding hole released a current of air, which tripped a «pneumatic» (vibrating disk), opening a valve which sounded the note. Tempo was given to the music and controlled by means of a stop which regulated the speed of the motor, and the rubato was formed by the ordinary crescendo swell. The different sets of reeds in the instrument were brought into play in the regular manner, by the pulling forth of stops. The performer not having to bother with the purely mechanical act of personally pressing down the keys, this being done by the automatic action of the attachment, he was left free to more perfectly render the expression the composer intended for his work.

This attachment proved so successful on the ordinary melodeon that it was desired to obviate the inevitable «brassy» effect which seems a part

of all flat-reed instruments, such as the common organ or melodeon. This was done by enclosing the different sets of reeds in tiny chambers of resonant woods, the air entering these chambers and being forced upward, instead of downward, as before. The result was a peculiarly round, full tone, which has become known as the "vocalion" system. The attachment was then applied to the pipe organ with fine effect. This æolian is (1904) made in large numbers by a New York corporation, which occupies a large building for the display of the attachment, so great has this business become. In this building is a pipe organ costing $35,000, with the latest æolian attachment, where song recitals are held, the control of the operator over the instumentation being absolutely perfect.

The latest application of the æolian principle is to the piano. Inasmuch as this required an acute delicacy of touch in fingering the instrument named, in order to meet the demands of a critical musical public, the production of a capable attachment was a problem of much difficulty in the solving. In 1898, this difficulty was met by the same company which had made possible the æolian, the attachment being called the "pianola." The paper roll and wind motor were used in the pianola, as in the æolian, but the pneumatic vibrators were made most sensitive, so that they vibrated with the rapidity and delicacy of the human fingers, giving a "touch" to the playing not excelled by Joseffy himself. In fact, it is impossible to tell whether the piano is being operated by an expert pianist or by the pianola, if the instrument be not seen.

These striking pneumatics are operated by both high and low pressure bellows, by the same action of pumping with the feet. By means of a small lever, the touch can be modulated from the softest pianissimo to the heaviest fortissimo. The mechanism is enclosed in an ornamental case, placed in front of the piano, with the felt-tipped steel fingers in position over the keys of the instrument. There are three tiny levers in front of the pianola, one controlling touch (as described), another tempo (or the speed at which the paper shall proceed from the roller) and the third operating the sostenuto, or loud pedal. This makes a fingering mechanism, as delicate and perfect as a watch, completely under the control of a human player, who can exhibit as much if not more artistic impulse than if compelled to use his hands to produce the touch.

The instant appreciation of the lovers of good music is shown by the fact that both the æolian and pianola are now sold in immense quantities all over the world. Their cost varies from $250 to many thousands. A late improvement is the making of a piano with the pianola attachment enclosed in the case of the piano, so that the instrument can be played by the hands, if desired. By releasing a spring, the pianola is made operative and proceeds to play any tune placed upon the roll. This instrument costs $850. An æolian for the pipe organ, which will play on both manuals of the organ from the same roll of paper, costs, in a size suitable for private homes, about $3,500.

All the various attachments for producing mechanical playing on the organ and piano have as their basis this principle of the perforated paper roll. They all took their form from the original æolian, and are known by various names, such as the "angelus," "pianotone," "pianograph," etc. This method of making automatic players for musical instruments is also applied to some few other instruments aside from the organ and piano. The most ingenious is, perhaps, the automatic banjo, or "encore," as its makers call it. In appearance this unique affair looks like an ordinary banjo, standing upright in a glass-covered cabinet. On each side of the strings near the bridge are claw-like "pickers," which catch the strings as would the human fingers. Above, along the frets, are several small disks over the strings, which are compressed on the strings to produce the tone variation desired, as by the fingering of the human hand. Inside the cabinet is an electric motor which rotates a roll of perforated paper, which releases the picks and disks as needed to produce the peculiar tone effects of the banjo. The rapidity of action demanded for the proper playing of negro melodies and such like music, common to this instrument, makes the invention one of much interest. It is in common use in many places in America, where music is desired to attract guests. A variation of this same idea is also seen in the automatic chimes of bells, where electrically moved perforated paper sets the bells in a cabinet jingling in more or less perfect tone.

Perhaps the best known automatic musical instrument in America is the hand organ, worked by a spring motor or by turning a crank. Thousands of such instruments are to be seen in every town and city. They are now made in this country principally, America having almost entirely taken away this trade from Italy and Switzerland. In the small hand organ, the system used in the ordinary music-box is employed, though many of the best and largest have adopted the perforated paper idea. Some of these latter have attachments that will play on a bass drum, a snare drum, cymbals, piano keys and reeds — all at once!

In some of the music halls of America are to be found huge automatic "orchestrions," which have several pipes like a pipe organ, as well as piano strings, cymbals, a drum, etc. These are limited to a few tunes only and are operated by powerful motors driven by steam or electricity. Their mechanism is intricate and they are continually getting out of order. The principle on which they are operated is largely that of the music-box, the paper roll not being used in them to any great extent. The "calliope" of the circus may justly be classed in this same automatic category, as it is sometimes played by use of the paper roll. In the calliope, the power is given by a steam engine, which also sends its steam into pipes of varying length and size, which, when emitted by pressing down a key, or valve, produces a hideous sound approaching music, which is heard a long distance — its chief recommendation.

One of the most useful and successful of the separate musical automatons of this class is an instrument invented and manufactured solely in America. It is called the "Regina" music-box and is made by the hundreds in New Jersey. Its principle of operation is a combination in effective form of both the perforated paper idea and the Swiss music-box construction. A zinc disk about eighteen inches in diameter has perforations around its circumference, the disk

revolving at the centre about a spindle, the rotation being effected by a spring motor. Underneath this disk is a chromatically arranged series of steel vibrators, each representing a definite tone. As the metal disk revolves, the vibrator is struck which corresponds to the note desired, the hole in the disk releasing a tiny hammer bar as it passes. The elongation of the hole causes a longer pulsation of the vibrator, producing long or short tones, as desired. There is practically no attempt made to give delicacy of touch, as in the pianola, but the music produced is much superior to the ordinary music-box, and the construction is simpler, cheaper and less liable to get out of order. Some forms of the regina are quite elaborate in construction as to case, the price ranging from $20 to above $500. The disks each contain perforations for one tune and cost little. They are almost indestructible, a manifest advantage over the perishable paper roll of the pianola or the wax record roll of the phonograph. Reginas of the largest size have sounding boards which enhance the tone vibrations.

Other late American inventions in the mechanical musical instrument line are numerous, though not in general use. Ever since Benjamin Franklin's musical glasses, which he called a "harmonica," attempts have been constantly made to play upon glasses, filled to different degrees with water to vary the tone, by mechanical means instead of using the moistened fingers. This has been practically solved. Wet chamois-covered fingers are automatically revolved around the rims of the glasses by the action of a perforated paper roll, as in the pianola. The result is almost equal to the work of human fingers and does nicely as a public entertainer. The "jewsharp," mouth organ and similar small instruments are also played automatically in like manner. In fact, the invention of the perforated disk, or roll of paper, opened up the field of successful operation in this line to a limitless extent and each day sees new methods of adapting it to all kinds of instruments.

One class of automatics not heretofore touched upon is the "nickel-in-the-slot" machine, with musical attachments. These machines are placed in the waiting-rooms of railway stations and ferries and in other public places, where one can put the mechanism into operation by inserting a penny or nickel into a slot. This releases a lever, which in turn operates a spring motor. The music is produced by the music-box method or by the disk of metal — like the regina.

There remain for consideration in this article the various forms of the phonograph, which was originated by Thomas A. Edison (q.v.) principally as a preservator of the human voice in speaking. It has come to be generally used as a mechanical musical instrument, as well. With the attachment of a long megaphone horn to increase the volume of sound, the songs of all the noted singers, the orchestrations of prominent bands, the instrumental and vocal solos and choruses of church choirs, etc., are so presented that they can be readily heard in a large hall. The several companies making these instruments in America employ the services of the best singers and instrumentalists to sing and play into their machines, the tones being perfectly recorded upon the sensitive wax rolls. These original, or master, records are then in turn put upon a deliverer, which sends forth the sound into a score of waiting machines, to be again and yet again recorded. The phonograph has found a deserved place in thousands of American homes. For full details of the construction of the phonograph, see article PHONOGRAPH. Also see PIANO, ORGAN, MUSIC, HARMONY, and kindred articles in this work.

PUTNAM DREW.

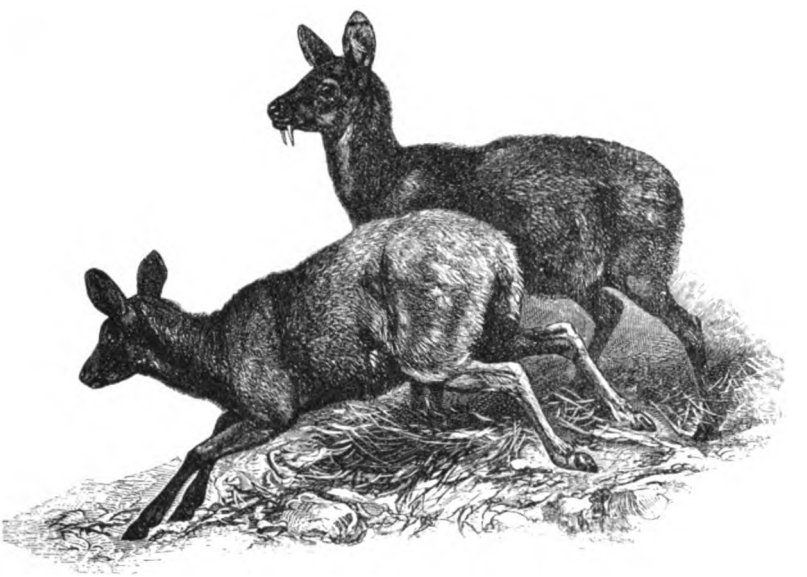
Musical Sand, beaches which emit musical tone or other sound when the sands are pressed under foot or struck together in a bag. They occur throughout the world, notably in the peninsula of Sinai, on the great musical mountain of Jebel Nagous; near Colberg in Pomerania; on the East Prussian coast; in the United States, where there are such sonorous beaches on the Atlantic, on the Wisconsin River (near Kilbourn City, Wis.), on the Mississippi (opposite Carondelet), and on the Pacific coast; in Hawaii, where there are "Barking Sands" in the southwest coast of Kauai; in Africa (Liberia and West Griqualand); in Botany Bay, New South Wales; and in Brown's River Bay, Tasmania. The sound is a mere squeak unless the sand is very dry; then it is musical. Hence the common explanation that the sound is due to the "rubbing together of millions of clean sand-grains very uniform in size" is less likely than the hypothesis that it is caused by the oscillation of the particles which are prevented by elastic air-cushions from actual contract.

Mu'sick, John Roy, American author: b. Saint Louis County, Mo., 28 Feb. 1849; d. Omaha, Neb., 14 April 1901. He was graduated at the Northern Missouri State Normal School in 1874, admitted to the bar in 1877, and until 1882 practised law at Kirksville, Mo., and elsewhere. Afterward journalism and authorship became his chief occupations. In 1878 he published in 'Potter's American Monthly' his first story, 'Justice Courts,' and among his later works may be mentioned: 'The Banker of Bedford'; 'History Series of Missouri'; 'Calamity Row'; 'Brother Against Brother'; 'The Mysterious Mr. Howard'; 'Hawaii'; 'Our New Possessions'; 'The War with Spain'; 'Cuba Libre'; and 12 'Columbian Novels,' dealing with the history of the United States. In these novels were passages which some newspapers described as plagiarisms from Dickens and Saint-Pierre, and in consequence Musick was made the object of much criticism.

Musin, mü-zăn, **Ovide,** Belgian violinist: b. near Liège, Belgium, 1854. He studied at the Liège Conservatory and won a first prize for violin playing when only 11. He played with signal success in various European capitals after 1870 and in 1883 made his appearance in New York at a Symphony concert in October of that year. He subsequently married the American soprano singer, Annie Louise Tanner, with whom he has made successive concert tours.

Musk, or **Muscovy, Duck.** See DUCK.

Musk-deer, a small deer-like animal (*Moschus moschiferus*) of the sub-family *Moschinæ,* differing from typical deer in the absence of antlers in either sex, in having only one lachrymal orifice, in the presence of a gall-



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1. Musk Deer.

2. Musk Ox.

Non Mau

bladder, and, in the male, of the musk-bearing glands to which the animal owes its name. Other peculiarities are the smooth brain, long tusks (canines) of the upper jaw, and the character of the feet, where the «false hoofs» come to the ground. These and other characters led Flower to declare it «an undeveloped deer,»— a representative of an ancient type.

The musk-deer is of small size, about 20 inches tall, grayish, marked with obscure stripes on the fore quarters and neck, thick-legged and ungraceful in form, but agile in movement. The species is confined to the highlands of Tibet and northward, where they frequent the pine-woods, going to the heights above them in summer. They dwell alone, or in family parties, are timid and secretive, feeding rarely except at night, and then subsisting partly on roots dug with their great teeth.

The males alone yield the musk secretion, which is furnished by a glandular sac or pouch situated on the abdomen, and averaging the size of a hen's egg. The secretion is resinous and unctuous, and becomes granular and of a dark color when dried. About 190 grains is stated to be the average quantity obtained from a single animal. When the musk-sac is first opened the odor is said by Tavernier to be so powerful that it causes the mucous membrane of the nose to bleed. The bag or «pod» is cut out by the hunters, and its orifices are tied, nevertheless the contents are often found much adulterated. The substance also reaches the market in a granular form, having been scraped off rocks where it has been deposited by the animal. The best comes by way of India and China, and is known as Tongking musk; a poorer quality comes from Siberia. Formerly musk had some value in medicine, but now is used almost wholly by perfumers; and the demand is so great that the animals are now comparatively rare, and the price of musk-pods has greatly advanced over former rates.

A somewhat similar secretion is possessed by many other mammals and reptiles, and in some cases, as of the muskrats (q.v.), is very strong, especially in the mating-season. The biological significance of it, no doubt, is sexual attraction. A similar odor belongs to certain plants. Consult Flower and Lydekker, 'Mammals' (1902).

Musk-ox, a singular ruminant (*Ovibos moschatus*), now confined to the Arctic regions of North America, but once circumpolar, and in Pleistocene times an inhabitant of all Europe and in America as far south as Kentucky. In general appearance it much resembles a large hairy sheep. Its body is clothed in long, brownish hair, with a warm undercoat of wool, very thick and tufted on the neck and shoulders, and elsewhere long and flowing, so that it hangs down almost to the feet. A lighter saddle-shaped patch marks the middle of the back. The tail is short and invisible. The legs are short and strong, and the hoofs of unequal size and shape, the outer being much broader than the inner one. The horns are broad at the base, covering the forehead and crown, much as do those of the Cape buffalo, then curve downward between the eye and the ear and then upward and backward. The average size of the male is that of a small domestic ox. This animal seems intermediate in structure between oxen and sheep, having part of its characteristics bovine and the other part caprine. A thorough exposition of its anatomy by Dr. Lönnberg may be found in the 'Proceedings' of the Zoological Society of London for 1900. The musky odor which belongs to them is not emitted by any special gland, but seems a general emanation, and is not very strong.

In habits these animals are gregarious, each herd numbering from 20 to 30 members. They migrate in winter from the most northern and exposed places to those farther south, or where food is more accessible, and are constantly hunted by the Esquimos as an important source of food. To this is added much destruction by fur-traders, whalers, and explorers, and their numbers are much diminished. Their present winter range is rarely south of the Barren Grounds (q.v.), between Hudson Bay and Great Slave Lake. Their food consists of moss, lichens, herbage and twigs of the dwarf willows and birches which grow in parts of their country. They are extremely wary, and their hunting requires great skill and endurance. Their flesh is good, their hides very useful and from their wool might be woven an admirable cloth could it be obtained in sufficient quantity. Consult books by Arctic explorers and Grinnell, Wister and Whitney, 'Bison, Musk-Ox and Sheep' (1903).

Musk Plant, a popular name for several unrelated plants. The species most cultivated in the United States is *Mimulus moschatus,* of the natural order *Scrophulariaceæ* and a native of the Western States. It is very popular in cool greenhouses and window gardens and, being hardy, in damp, shady places out of doors. In Europe, the name is most applied to *Erodium moschatum* of the natural order *Geraniaceæ,* a native of the Mediterranean region, growing in gardens from annually sown seeds. The name is applied in the West Indies to *Guarea grandifolia,* which is also known as musk wood, and to *Trichilia moschata,* also called musk tree. This last popular name is also applied to a Tasmanian tree (*Olearia argophylla*). An East Indian plant (*Euryangium sumbul*) is probably best known in the markets as musk root. Its starchy roots are used as a substitute for musk in perfumery.

Musk-shrew. See MUSKRAT.

Musk-turtle, or **Stinkpot.** See BOX-TURTLE.

Musk-wood, a tree (*Guarea grandifolia*) of the tropical American order *Meliaceæ,* so called in the West Indies because the bark smells so strongly of musk that it may be used as a perfume. Although the tree attains timber size the wood contains a bitter resinous substance which unfits it for many purposes. The bark of several trees of this genus is used as an emetic and purgative.

Several other trees and plants give a musky odor, such as the musk-plant, one of the monkey-flowers (*Mimulus*); the grape-hyacinth; the musk-mallow or musk-okra; the starchy root of the Asiatic *Euryangium sumbul,* which is used to adulterate true musk; the Tasmanian musk-tree (*Olearia argophylla*) and others.

Muskegon, mŭs-kē'gŏn, Mich., city, county-seat of Muskegon County; at the mouth of the Muskegon River, on Muskegon Lake, and on

the Grand Rapids & I., the Toledo, S. & M., and branches of the Pere M. R.R.'s; about 95 miles northwest of Lansing, and 38 miles northwest of Grand Rapids. Lake Muskegon, upon which the city is situated, is connected with Lake Michigan by a channel 200 feet wide and of sufficient depth for large vessels. This gives the city an excellent harbor for lake steamers, which connect it directly with all the important lake ports. The harbor is clear of ice all the year.

Muskegon was first settled in 1834, although a temporary trading post was established here in 1812. It was incorporated as a village in 1861 and chartered as a city in 1869. The chief manufactures are furniture, curtain rollers, refrigerators, flour, beer, knit-goods, paper, pianos, iron products, chemical engines, tin-plate products, electric cranes, leather, and cutlery. It has a large trade in lumber, the manufactures of the city, fruit, celery, vegetables, and farm products. The city has been greatly favored by the numerous donations of one of its own citizens. He has presented a public library, a gymnasium, a manual training school, an endowed hospital, and a square upon which has been erected a soldiers' monument, and several bronze statues. The government is vested in a mayor, who holds office one year, and a council. The waterworks are owned and operated by the city. Pop. (1890) 22,702; (1900) 20,818.

Musket, a small hand-gun with which infantry soldiers were formerly armed. When first introduced, early in the 16th century, it was discharged by means of a lighted match, and was so heavy that it had to be laid across a staff to be fired. To make use of it the soldier required to carry a slow-burning match with him which was apt to be extinguished in wet weather. The wheel-lock followed, the chief feature of which was a wheel made to revolve by means of a spring, and to cause sparks by friction against a flint. The next improvement was the flint-lock proper (about 1625), in which sparks were produced by one impact of a piece of flint on the steel above the priming powder. Musketeers were soon introduced into all armies, and in the beginning of the 17th century infantry consisted of pikemen and musketeers, and all changes in regard to the relative proportion of the two arms were always in favor of the latter. The flint-lock musket was introduced into the British army toward the end of the 17th century, and was the British musket of the days of the Peninsular war and Waterloo, known familiarly as "Brown Bess." It was superseded by the percussion musket in 1842, this musket being in turn superseded by the rifle. See ARMS AND ARMOR; FIRE ARMS; RIFLE.

Musketoon', a short, thick musket, used in the 18th century but now obsolete; the bore was the thirty-eighth part of its length; it carried 5 ounces of iron or 7½ of lead, which was discharged by an equal quantity of powder.

Mus'ketry, the science and art of shooting with small-arms, especially with the musket or rifle. In connection with the British army there is a musketry school, where officers and non-commissioned officers of infantry and cavalry are trained in musketry.

Muskhogean (mŭsk-hō-gē'ạn) **Stock.** See CREEKS.

Mus'kellunge, Maskinonge, etc., the great pike (*Lucius nobilior*) of the lakes of the interior of North America. See PIKE.

Muskingum, mŭs-kĭng'gŭm, a river of eastern Ohio with a course of about 120 miles wholly within the State. It is formed by the junction of the Tuscarawas and the Walhonding at Coshocton in the county of the same name, and it flows in a general southeast direction through a beautiful and fertile valley to Marietta, where it joins the Ohio. The chief towns on its banks are Zanesville, McConnellsville, and Marietta. It is navigable for 90 miles to Dresden.

Muskingum College, in New Concord, Ohio, founded, under the auspices of the United Presbyterian Church, in 1837. In 1903 there were connected with the institution 15 professors and instructors, and about 300 pupils. There were about 4,000 volumes in the library; the buildings, grounds, and furnishings were valued at $40,000; the productive funds were nearly $50,000. The annual income, which includes tuitions, interest from productive fund, fees, etc., amounted to about $12,000. The courses lead to the degrees of A.B. and B.S.

Musk'melon, or **Cantaloupe.** See MELONS.

Muskogi Indians. See CREEKS.

Muskoka, mŭs-kō'ka, Can., a county of Ontario, bordering on Georgian Bay, the name also being borne by a beautiful lake and river, and comprehensively applied to the extensive region lying between Georgian Bay on the west, Lake Nipissing on the north, Ottawa River on the east, and Lake Simcoe on the south. The capital of the county is Bracebridge on the Grand Trunk Railroad, pop. (1901) 2,479. The region with between 800 and 1,000 lakes and smaller bodies of water, chief of which are Muskoka, Rosseau, and Joseph lakes, all abounding in fish; several rivers and picturesque waterfalls, notably High Falls and South Falls on the Muskoka River and Bridal Veil Falls on the Shadow River, and extensive forests filled with game, is a paradise for sportsmen which is become more widely known and visited every year. During the summer steamboats ply on the principal lakes connecting with the Grank Trunk and Canadian Pacific R.R.'s.

Muskrat, or **Musquash,** an aquatic rodent (*Fiber zibethicus*) numerous throughout North America, and yielding a valuable fur. It is a member of the rat family (*Muridæ*), and is, in effect, a gigantic vole or meadow-mouse, with a tail flattened sideways into a powerful swimming instrument, and fringed with stiff hairs; the hind feet are set obliquely to the leg; the ears are very small and buried in fur, the muzzle is blunt and furry; the palms and soles are naked and fringed with hairs. The average total length is about 21 inches, of which the tail is more than a third, measuring as long as the body without the head. The color varies above from almost black to pale brown; sides of head and body chestnut-brown; under-fur bluish gray; feet dark brown; tail black. Those of the Rocky Mountain region are smaller and paler than eastern ones. The musky odor of these animals is due to a thick fluid secreted in

two small glands near the generative organs, which imparts a taint to the flesh that makes it unpalatable to most persons.

These animals reside along small streams, and in swampy places generally, being most abundant around Chesapeake Bay and in the marshy lakes of the upper Mississippi region and northward to Hudson Bay. Where the banks have some elevation they form extensive burrows, which have entrances below the surface of the water, and gradually ascend till they terminate in a chamber above the level of high water. These burrows are most frequently made under the roots of trees, or in other situations of difficult access. The excavations are of great injury to artificial embankments along canals and rivers, by permitting the water to undermine and to make large breaches in them, and in some parts of the country they do serious damage to canal embankments and river-dikes. When, however, these animals inhabit low and marshy situations, they construct conical houses usually surrounded by water, not unlike those of the beaver but smaller, composed of reeds, etc., mixed with clay. These houses have subterranean passages leading to them, and are inhabited by many individuals during the winter; but in the warm weather they desert them entirely, and dwell in pairs in a bank-burrow while they rear their young. The houses contain a large, smooth-walled chamber, above the waterline; and when frozen are sufficiently solid to form a protection against all but the largest carnivora; but they are usually destroyed and swept away in the spring floods, so that a new house is erected every season.

The muskrat feeds mainly upon aquatic vegetation, especially the rootstocks and basal parts of stems, and is especially fond of the pond-lily. These it brings to the shore to eat, almost always during the night, for it is essentially nocturnal, although often seen abroad in the daytime. It is very fond of mussels, and brings great quantities of these ashore, always, when possible, at the same place, so that piles of their shells accumulate to indicate favorite feeding-spots. In summer the muskrats feed on shore-herbage somewhat, and frequently go some distance to get a meal of growing corn, garden vegetables or fallen fruit. They are accused also of occasional fish-catching, and are unwelcome in waters devoted to fish-culture. Because of the commercial value of its fur and of its destructiveness in some places, or for amusement, the muskrat is incessantly persecuted by man, as well as preyed upon by many natural enemies — minks, wolverines, foxes, wildcats, badgers, wolves, birds of prey, water-moccasins, snapping-turtles, pikes and others, which capture many young and some adults. Nevertheless they are so secretive and so prolific, and have found so many advantages in the civilized parts of the country, that they survive even in the most thickly settled districts, and are likely to maintain their numbers indefinitely. They produce from three to nine young at a birth, and often breed two or three times a year.

The fur of the muskrat is dense and soft, but inferior to that of the beaver. It was formerly little esteemed, but during the last century has come more and more into use, beginning with a demand early in the 19th century for making "beaver" hats. When this industry was ended by the introduction of silk hats the demand diminished, but revived again, until, about 1870, London was receiving about 4,000,000 skins annually, besides some 500,000 consumed in America and 1,500,000 sent to Germany, principally Leipsic. The price then began to fall, but the product amounted in 1903 to about 5,500,000 pelts. The best "No. 1 black" skins averaged in London, in 1903, about 30 cents.

"Muskrat fur," according to a recent authority, "is used more extensively in Europe than in America, the Russians and Germans being especially large consumers. It is employed in making gloves, collars, caps, capes, muffs, trimmings, linings, etc., and is made up either natural, plucked, plucked and pointed, or plucked and dyed black or various shades of brown. Large quantities are used as linings for overcoats and long wraps, from 40 to 60 being necessary for each garment. Sometimes the under parts are used separately for this purpose, the natural white color being quite effective. The skins of young animals are especially suited for linings. The unplucked skins are frequently dyed to imitate mink, and sold as 'Alaska mink,' 'water mink,' or 'black mink.'"

Muskrats are taken by shooting, spearing in winter (through their houses, or through the ice), or, most numerously, by trapping. Ordinary steel traps are used, placed under the water inside a broken house, or in a runway or landing place, baited with an apple, or bit of parsnip, and often scented with musk or an aromatic oil, and fastened by a heavy chain so arranged, if possible, as to lead the animal to drown itself in its struggles. In certain districts, as along Chesapeake Bay, men make a regular business of trapping muskrats in winter; and even own, or rent, large spaces of marshland for that purpose.

The books of Audubon, Godman, Hearne, Richardson, Merriam and all general writers on American mammals should be consulted; also Stone and Cram's 'American Animals' (1902); Herrick, 'Mammals of Minnesota' (1892); and the files of the 'American Naturalist' and of 'Forest and Stream.'

Muskrat, Indian, a name among the British residents in India for a shrew (*Crocidura cærulea*), about the size of the common rat, which comes into houses at night hunting for cockroaches and similar insects, and makes its presence known by occasional shrieks. This animal emits a peculiarly strong and penetrating odor of musk, which clings to everything the little beast touches, and arises from two large musk-glands beneath the skin of the side of the body a short distance behind the forelimbs. Consult Blanford, 'Mammalia of British India' (1888).

Mus'lim, or **Moslem.** See MOHAMMEDANISM.

Muslin, a fine cotton fabric. The name is said to be derived from the city of Mosul in Mesopotamia. The texture of muslin is usually plain, but sometimes adorned with figured patterns. The manufacture of muslin was introduced into Europe from India about the end of the 17th century, and it is now largely carried on both in Great Britain and in France.

Mus'quash, a name in the Canadian Northwest for the local muskrat (q.v.).

Mussel-pecker, a bird, the oyster-catcher (q.v.).

Musselburgh, mŭs'l-bŭr-ō, Scotland, a town and seaport of Midlothian, 6 miles east of Edinburgh, on the Firth of Forth, at the mouth of the Esk, which divides it into two parts, Musselburgh proper and Fisherrow. It has noted golf-links, a bridge of Roman origin, and a curious old tolbooth built in 1590, out of materials from the celebrated Chapel of Loretto. The chief manufactures are leather, paper, and fishing-nets by machinery. There is a fishing population of about 1,100. The battle of Pinkie, in 1547, was fought in the vicinity. Pop. (1901) 11,704.

Mussels, Fresh-water. See FRESH-WATER MUSSELS.

Mussels, Marine. The marine mussels belong to a family (*Mytilidæ*) of bivalve mollusks which have the anterior retractor muscles very small, the posterior large, and the two valves of the shell equal and covered by a thick horny layer. Numerous species occur in all seas and, because of the comparative delicacy of their flesh, and their habit of forming immense beds, many are of commercial importance. Foremost in this respect is the edible mussel (*Mytilus edulis*) which has a smooth, dark-colored, wedge-shaped shell with the umbos or beaks exactly at the hinge end. This species is circumpolar in its distribution, and on our Atlantic coast extends southward to North Carolina. Wherever rocky reefs, piles, or other suitable objects for attachment occur at low water, combined with currents for bringing food, this mollusk multiplies into extensive colonies. In Europe it is valued much more highly than in this country, where it is chiefly used for bait, although considerable quantities are canned in New York. Besides the fisheries on natural beds this mussel is regularly cultivated in France by methods akin to those used in European oyster culture. The genus *Modiola,* containing the so-called horse-mussels, is distinguished by the more oblong shell inflated toward the hinge end, from which the umbos, though close, are quite distinct. The best known one (*M. modiolus*) is a large species distinguished by the nearly unribbed surface and the coarse hairy epidermis. It has nearly the distribution of the *Mytilus,* and abounds in the north on rocky shores at low water and below to a considerable depth. *Modiola plicatula* is distinctly ribbed and has a thinner epidermis. This is an American species which ranges from Nova Scotia to Georgia and is extremely abundant at low water on the mud-flats of the New Jersey coast, where it is doubtless effective in the upbuilding of sedimentary areas. These two species are less valued for food than the *Mytilus,* but are largely utilized in certain localities as fertilizers. Consult: Goode, 'Fishery Industries of the United States' Sec. 1 (1884); Cooke, 'Mollusca' (1895).

Musset, Louis Charles Alfred de, loo-ē shärl äl-frā dė mü-sā, French poet, novelist, and dramatist: b. Paris 11 Dec. 1810; d. there 2 May 1857. After trying various professions and being dissatisfied with them all he, about 1830, gave himself up wholly to literature, and in that year published poems, 'Contes d'Espagne et d'Italie.' In 1831 appeared a new collection entitled 'Poésies Diverses,' and in 1833 a third, bearing the general title 'Un Spectacle dans un Fauteuil,' in which the chief pieces are a comedy of a light and delicate grace called 'A quoi Revent les jeunes Filles,' and a poem, 'Namouna,' written after the manner of Byron. His 'Confession d'un Enfant du Siècle' (1836) is a gloomy autobiographic novel, containing the analysis of a diseased state of mind, all the phases of which the author had studied in himself, and which had already revealed itself in some of his earlier poems. The same settled melancholy also distinguishes his 'Rolla,' 'Une bonne fortune,' 'Lucie,' 'Les Nuits,' 'Une Lettre à Lamartine,' 'Stances à Madame Malibran,' 'L'Espoir en Dieu,' and other poems, written some before and some after the 'Confession' published in the 'Revue des Deux Mondes.' The prose tales he contributed to the same periodical are full of grace and feeling. The same qualities are found in his comedies and *proverbes* (short dramatic pieces), published in 1840. One of these short pieces 'Un Caprice,' was performed at the Théâtre Français in 1847, and although not composed in accordance with the customs of the stage, succeeded by the truth of the characters and the charm of the dialogue. De Musset was made librarian of the department of the interior in 1838, of which post he was afterward deprived, and of the department of public instruction in 1855. In 1852 he was admitted a member of the French Academy. Among his dramatic works perhaps the best is 'Les Caprices de Marianne,' a classic of the Théâtre Français repertory. He has been ranked after Hugo and Lamartine as the third French poet of the 19th century. Consult biographies by Paul de Musset (1877; Eng. trans. by H. W. Preston 1887), and Barine (1893).

Mus'sey, Reuben Dimond, American surgeon: b. Pelham, N. H., 23 June 1780; d. Boston 21 June 1866. He was graduated at Dartmouth in 1803; studied medicine at the University of Pennsylvania; practised in Salem, Mass.; taught in the Dartmouth medical school 1814–20 and 1822–38, at Bowdoin 1833–5, at Ohio Medical College 1837–50, and at Miami Medical College, which he founded, 1851–8; and spent the last eight years of his life in practice in Boston. He was a famous operator, the first to remove the shoulder blade, or to tie both carotid arteries, and successful in his operations for stone, for removing ovarian tumor, for strangulated hernia, and in subcutaneous deligation in varicocele. Mussey wrote 'Health: Its Friends and Its Foes' (1862).

Must, the juice of the grape, which by fermentation is converted into wine. In the wine countries this unfermented sweet must is distinguished from the sour must or unripe wine of a year old.

Mus'tang. See BRONCO.

Mus'tard, a genus of annual, biennial and perennial herbs (*Brassica*) of the natural order *Cruciferæ.* The species, of which about 100 have been described, are characterized by yellow four-petaled flowers, linear or oblong pods containing one row of seeds. All are noted for their more or less biting flavor for which some are valued as esculents. In a generic sense, cabbage, kale, cauliflower, turnip, and other vege-

tables are mustards, but specifically the name is restricted to a few species of which the following are the most important: Black mustard (*B. nigra*) so called from its dark brown seeds, white mustard (*B. alba*) the seeds of which are yellowish, Indian mustard (*B. ramosa*), and *B. arvensis*. These are all cultivated for their seeds which when ground constitute the popular condiment, mustard. Sometimes flour and turmeric are added to the mustard to dilute and color it. The young plants are often eaten like spinach or as a salad. They may be easily obtained from seed sown in any garden soil.

Mustard Oil. See OIL OF MUSTARD.

Mustil'idæ. See FUR-BEARING ANIMALS.

Mut, moot, in Egyptian mythology, a goddess of heaven and queen of earth, the wife of Ammon and the mother of Chons. Her name signifies "mother."

Muta Nzige, moo'tā nzē'gā, Africa, the local name for a lake discovered by Stanley in 1876, explored by him in 1889, and renamed the Albert Edward Nyanza (q.v.).

Mutanabbi, moo-tä-näb'bē (Arabic, "the alleged prophet"), Arabian poet: d. Kufa, Asiatic Turkey, 965 A.D. He published a 'Divan,' or collection of verse, a German translation of which exists ('Motenebb der grösste arabische Dichter' 1824).

Muta'tion Theory, a hypothesis of organic evolution which accounts for development by sudden changes or "leaps" rather than by slow and successive degrees; sometimes styled saltatorial evolution. It is illustrated by "Sports" (q.v.),—sudden aberrations from the normal, more familiar in botany than in zoology, but often occurring there. This mode of evolution has always been regarded as effective to some degree, but its general application was urged by Prof. Hugo De Vries in a work 'Die Mutationstheorie,' published in 1901.

Muther, moo'tĕr, **Richard,** German art historian: b. Ohrdruf, Germany, 25 Feb. 1860. He was educated in the University of Heidelberg and the conservatory at Munich and devoted his attention to the history of art in which subject he has been professor at the University of Breslau since 1895. He has published: 'Anton Graff' (1881); 'Gothic and Early Renaissance Illustrations of German Books' (1884); 'Meisterholzschnitte aus den Jahrhunderten' (1887); 'The History of Modern Painting' (1893); 'A Century of French Painting' (1901); 'Geschichte der englischen Malerei' (1902); etc.

Mutineers of the Bounty, The, a work published in 1870 by Lady Diana Belcher. It is an account of a unique settlement on a South Sea island. In 1789 H. M. S. Bounty, Lieutenant Bligh commanding, while sailing in the South Seas was captured by mutineers, and the commander with 18 of the crew were set adrift in the cutter. The ship sailed to Tahiti. There dissensions arose among the mutineers. Half of them sailed away, and all trace of them was lost for many years. Some 20 years later, a British vessel happened accidentally to stop at Pitcairn's Island. The officers were amazed to meet young men who spoke excellent English, and to find a prosperous and happy Christian community, largely descendants of the mutineers. It was learned that the Bounty sailed directly from Tahiti to Pitcairn's Island, where the mutineers made a settlement. One of them, John Adams, remembering his early Christian training, established the principles of the Christian religion firmly in this peculiar community, which, maintaining its essential characteristics, still occupies Pitcairn and Norfolk Islands.

Mutiny (Fr. *mutin,* refractory, stubborn; *mutiner,* to rise in arms). Two hundred years ago the word mutiny was often used in describing insurrection or sedition in civil society; but it is now applied exclusively to certain offenses by sailors and soldiers. Properly it is the act of numbers in resistance of authority; but by statutes, certain acts of individuals are declared to be mutiny. The act of Congress of 3 March 1835 defines mutiny or revolt in the following language:

> If any one or more of the crew of any American ship or vessel on the high seas, or on any other waters within the maritime and admiralty jurisdiction of the United States, shall unlawfully, wilfully, and with force or by fraud, threats, or other intimidations, usurp the command of such ship or vessel from the master or other lawful commanding officer thereof; or deprive him of his authority and command on board thereof; or resist or prevent him in the free and lawful exercise thereof; or transfer such authority and command to any other person not legally entitled thereto; every such person so offending, his aiders and abettors, shall be deemed guilty of a revolt or mutiny and felony.

The same statute provides for endeavors and conspiracies to excite mutiny. In construction of the act it has been held that mere disobedience of orders by one or two of the seamen, without any attempt to excite a general resistance or disobedience, and insolent conduct or language toward the master or violence to his person, if unaccompanied by other acts showing an intention to subvert his authority as master, are not sufficient to constitute the offense of endeavoring to excite mutiny. An indictment for this crime, it is said, must set forth a confederacy of at least two of the men to refuse to do further duty, and to resist the lawful commands of the officers. The offense of making a revolt was by the act of April, 1790, punishable by death. By the act of 1835, it is punished by fine not exceeding $2,000, and by imprisonment and confinement at hard labor for not more than 10 years, according to the nature nnd aggravation of the offense; while attempts to excite a mutiny are punishable by fine not exceeding $1,000, or by imprisonment not exceeding five years, or by both. Mutinous conduct in the army and navy is provided for by the acts of 10 April 1806 and of 23 April 1800. By the former, "any officer or soldier who shall begin, excite, cause, or join in any mutiny or sedition, in any troop or company in the service of the United States, or in any party, post, detachment, or guard, shall suffer death, or such other punishment as by a court martial shall be inflicted." Under the latter, "if any person in the navy shall make, or attempt to make, any mutinous assembly, he shall, on conviction thereof by a court martial, suffer death." The law of mutiny in Great Britain is similar to the United States statute.

Mu'toscope, a mechanical apparatus for exhibiting instantaneous pictures of moving objects taken by the kinetograph or similar instrument. Photographic prints from the series of

pictures thus obtained are mounted in consecutive order around a cylinder standing out like the leaves of a book. When this cylinder is slowly revolved, the picture cards being held back by a stop, and allowed to snap past the eye one by one, as one thumbs the leaves of a book, an apparently moving picture is the result, and it is difficult to realize that the picture is not endowed with life.

Mutsuhito, moot'soo-shtō, emperor of Japan: b. Kioto 3 Nov. 1852. He was son of the Mikado Komeïtenno, whom he succeeded 3 Feb. 1867. The fall of the shogun in 1868 gave him more power than his ancestors had enjoyed for many centuries. The empire became a constitutional monarchy in 1889, when the Salic law became effective; European influence has steadily grown, but whether because of or in spite of the Mikado is unknown. The principal events of his reign are the Chino-Japanese war (1895), Japanese intervention in China (1900), the Anglo-Japanese *entente* (1902), and the still unsettled contest between Japan and Russia over their respective positions in Korea and Manchuria. The Mikado's heir, Harunomiya, is his son by a concubine or second wife; the queen is Haruko, daughter of a noble, and Mutsuhito's wife since 9 Feb. 1869.

Mutton-bird, a sailors' name for the shearwater (q.v.).

Mutton-fish, a local name for various fishes noted for their fatness, especially the eel-pout (q.v.).

Mut'tra, India, the chief town of a district of the United Provinces, on the Jamna, 36 miles northwest of Agra. It is an old Hindu city, and is identified by some with the Methora mentioned by Arrian. It is regarded as the birthplace of Krishna, and is a great centre of Hindu devotion, being resorted to by large numbers of pilgrims. It has numerous temples, mosques, bathing ghats, a museum, and the 17th century observatory of the Hindu astronomer Jey Singh. Pop. (1901) 59,574.

Muyscas, mū-ē'skä. See CHIBCHAS.

Muzaffar-ed-Din, moo-zä-fėr'ĕd-dēn', Shah of Persia: b. Teheran 25 March 1853. He was governor of Azerbaijan; succeeded his father, Nasr-ed-Din (q.v.), 1 May 1896; was largely influenced by European civilization and politically by France and Russia; and visited Europe several times; in 1900 was attacked by an anarchist named Salson in Paris; and in 1902 again visited western Europe and England. His heir is Muhammed Ali Mirzi, b. 21 June 1872.

Muzaffarpur, mŭz-ăf-ạr-poor', India, the chief town of a district in Bengal, on the Little Gandak River, 38 miles by rail northeast of Patna. It has broad well-kept streets, fine public buildings, two large temples, large bazaars, and carries on a considerable trade, chiefly in saltpeter and indigo. Pop. (1901) 45,617.

Můzáková, Johana. See SVETLA, KAROLINA.

Muziano, Girolamo, jē-rō-lä'mō moot-sē-ä'nō, commonly known as BRESSANO, Italian painter: b. Aquafredda, near Brescia, 1528; d. Rome 27 April 1592. He was a pupil of Romanino (see ROMANINO GIROLAMO) and of Titian at Venice, and subsequently imitated Michelangelo. He was a skilful mannerist who could paint in any style while possessing none of his own. Among his most successful pictures are: 'The Taking Down from the Cross,' in the Borghese Gallery, Rome; 'The Gift of the Apostolic Keys,' in the Vatican. There are also some frescoes of his still to be seen in the Vatican.

Muz'zey, Artemas Bowers, American Unitarian clergyman: b. Lexington, Mass., 2 Sept. 1802; d. Cambridge, Mass., 21 April 1892. He was graduated at Harvard University in 1824, and from Harvard Divinity School in 1828, and entering the Unitarian ministry held pastorates in Framingham, Cambridgeport, and Newburyport, Mass., and Concord, N. H. He was active in educational and political matters, and in 1865 retired from ministerial duties. Among his numerous publications are: 'The Young Man's Friend' (1836); 'Man, a Soul' (1842); 'The Higher Education' (1871); 'Personal Recollections of Rev. Dr. Channing' (1874–5); 'Immortality in the Light of Scripture and Science' (1876); 'Education of Old Age' (1884).

My'all Wood, the hard violet-scented wood of the Australian *Acacia homalophylla,* much used for making whip handles and tobacco pipes.

Mycale, mīk'ạ-lē, Asia Minor, the classical name of the modern Samsun, a mountain of south Ionia, with the promontory of Cape Santa Maria opposite the island of Samos as its seaward termination. In its vicinity the Persian army and navy under Tigranes were defeated by the Greeks, under Leotychides, king of Sparta, and Xanthippus, in September 479 B.C. But few of the vanquished survived the contest, the Greeks burning the Persian fleet and camp.

Mycenæ, mī-sē'nē, Greece, an ancient city of Argolis in the Peloponnesus, six miles northeast of Argos, built on a steep hill dominating the passes to Corinth. Its ruins since Schliemann's excavations in 1876 have yielded an abundance of archæological treasures of the greatest value and interest, illustrating and revealing the distinctive Mycenæan period of civilization, which preceded the culminating era of Hellenic culture. Mycenæ is said to have been founded by Perseus, and before the commencement of the Trojan war was the residence of Agamemnon, in whose reign it was regarded as the leading city in Greece; it was also the scene of the domestic tragedies of Atreus (q.v.). It declined in importance after the invasion of the Dorians, but its cyclopean walls, citadel, and other features, chief of which are the Lion's Gate, and the vaulted building of megalithic architecture called the Treasury of Atreus (q.v.), stood through succeeding centuries, and still stand, as monuments of its ancient grandeur and importance. Consult: Schuchhardt-Sellers, 'Schliemann's Excavations' (1891); Hall, 'The Oldest Civilization of Greece' (1901); Tsountas and Manatt, 'The Mycenæan Age' (1897).

Mycose, or **Trehalose,** a substance resembling sugar, and classified with the sugars, which occurs in ergot of rye, in trehala manna, and in certain fungi. It has the chemical formula $C_{12}H_{22}O_{11}.H_2O$, crystallizes in rhombs, gives up its water of crystallization at 212° F., and melts at 228° F. It dissolves readily in water, and is sweet to the taste, but it does not reduce Fehling's solution. Acids slowly convert it into dextrose.

Myeli'tis (from Greek *μυελός*; marrow), an inflammation attended with more or less softening of the substance of the spinal cord. It may be acute or chronic. Some of the maladies formerly ascribed to chronic myelitis are now known to be due to chronic induration and thickening (sclerosis). The most common causes of myelitis are: irritation of the cord by fractured, dislocated, or diseased vertebræ, by the pressure of a tumor, or by hemorrhage into its substance. The disease is aggravated by intemperate habits. It begins usually with pain or other uncomfortable sensations in the spine or extremities, and fatigue, followed by an uncertain gait, paralysis, and very frequently death. If the inflammation involves the upper part of the cord above the origin of the respiratory nerves, respiration is interfered with and death results from asphyxia. If the inflammation exists lower down, in addition to the loss of motor power in the extremities the bladder and rectum may be paralyzed, the evacuations are discharged involuntarily, and death occurs from exhaustion. The tendency of the inflammation is to spread.

Myer, mī'ėr, **Albert James,** American meteorologist: b. Newburg, N. Y., 20 Sept. 1827; d. Buffalo, N. Y., 24 Aug. 1880. He was graduated from Hobart College in 1847 and from the Buffalo Medical College in 1851 and in 1854 became a surgeon in the United States army. While on duty in Texas he devised a signal system consisting of flags by day and torches at night, so simple yet so ingenious that it has been adopted by the armies of the world. He was in command of the signal corps in 1858–60 and in the latter year was commissioned major and appointed chief signal officer of the army. He served in the Civil War in 1861–3 and then took charge of the signal office at Washington and introduced his system at West Point. He was promoted brigadier-general in 1865 and soon afterward retired from the army. He was engaged in the preparation of his book on the signal system and in meteorological investigations at Buffalo until 1870 when he was appointed to take charge of the meteorological observations under the government. The work of the weather bureau was soon recognized as important and was widely extended under General Myer's direction, 300 stations being established before his death. He was United States delegate to the International Congress of Meteorologists at Vienna in 1873 and in 1879 to that held at Rome. He published 'A Manual of Signals for the United States Army and Navy' (1868).

Myers, mī'ėrz, **Ernest James,** English poet, brother of F. W. H. (q.v.): b. Keswick, Cumberland, 1844. He was called to the bar in 1874, but has never practised. He has published: 'The Puritans' (1869); 'Poems' (1877); 'Defence of Rome and Other Poems' (1880); 'Judgment of Prometheus and Other Poems' (1886); etc.; besides translating the odes of Pindar (2d ed. 1884).

Myers, Frederic William Henry, English author: b. Duffield, Derbyshire, 6 Feb. 1843; d. Rome, Italy, 17 Jan. 1901. He was educated at Cambridge, was classical lecturer there at Trinity in 1865–9, and was school inspector from 1872 until his death. In 1882 he assisted in founding a Society for Psychical Research, of which at the time of his death he was president. He was best known as an essayist of much interest, but had also done some work in verse. Among his publications are: 'St. Paul' (1867; new ed. 1879), a poem; 'Wordsworth' (1880), in 'English Men of Letters'; 'Renewal of Youth, and Other Poems' (1882); 'Essays, Modern and Classical' (1883); 'Phantasms of the Living' (with Gurney and Podmore, 1886); 'Science and a Future Life' (1893); and the massive 'Human Personality and its Survival of Bodily Death' (1901).

Myers, Mordecai, American soldier and official: b. Newport, R. I., 1776; d. Schenectady, N. Y., 20 Jan. 1871. On the breaking out of the War of 1812 he enlisted and became a major in the 30th infantry. For a time he was a merchant in Richmond, Va., when he removed to New York. His later life was passed in Schenectady, N. Y., where he served for two years as mayor and for six years in the legislature as member for that district. He held a prominent place in the Masonic fraternity, having been elected grand master and grand high priest of Royal Arch Masons of the State of New York.

Myers, Philip Van Ness, American historian: b. Tribes Hill, N. Y., 10 Aug. 1846. He was graduated from Williams College in 1871 and studied at Yale in 1873–4. He then traveled for three years in Europe and South America, and in 1879–90 was president of Farmers' College, Ohio. He was professor of history and political economy at the University of Cincinnati in 1890–1900, and has published: 'Life and Nature Under the Tropics' (1871); 'Mediæval and Modern History' (1889); 'History of Greece' (1897); 'The Middle Ages' (1902); etc.

Myers, Theodore Walter, American banker: b. New York 11 Jan. 1844. On the breaking out of the Civil War he was appointed captain of the Third regiment, Sickles' brigade; and later was captain of the Ninth regiment, New York National Guard, being connected with the City Guard for many years. In 1864 he entered Wall Street, became a member of the Stock Exchange, and after being associated with various firms, in 1884 organized the bank of Theodore W. Myers & Company. In 1887 he was appointed park commissioner and treasurer of the department. In 1888–91 he served as city comptroller, with such success as to be renominated and re-elected by both Republicans and Democrats for term of 1891–3. During his term of office he negotiated a loan of $14,000,000 for the city at the surprisingly low rate of 2½ per cent.

Myg'ale, the technical and book-name of a species of trap-door spider (*Mygale avicularia*) which has been known to catch small birds and kill them. It is a native of Surinam, Brazil, and adjoining regions. It is the largest of all the spiders, being very stout, with thick, hairy legs. It builds its nest in trees. Similar species are brought into our ports in bunches of bananas. The fact that the bird-spider will actually kill birds and suck their blood was asserted by Madam Merian in 1705. Her statements were received with doubt, but long after were verified by Bates. The specimen he observed on the Amazon River was nearly two inches in length, the legs expanding seven inches. He

saw the monster on a tree-trunk beneath a deep crevice in the tree, across which was stretched a dense white web. "The lower part of the web was broken, and two small finches were entangled in the pieces; one was quite dead, the other was still living and was smeared with the filthy liquor or saliva exuded by the monster." The natives call them *aranhas caranguejeiras,* or "crab-spiders." The hairs on the body and legs come off when touched, and "cause a peculiar and almost maddening irritation." This, Bates thinks, is not due to any poisonous quality residing in the hairs, but to their being short and hard, and thus getting into the fine creases of the skin.

Myia'sis, a condition caused by the larvæ of flies. House-flies may affect the skin of man by depositing eggs in wounds and on ulcerations, or may invade the external cavities of the body. The eggs hatch, and the maggots cause much local irritation and symptomatic fever; or in the case of the bot-fly (q.v.), penetrate the skin deeply and produce large abscesses. The maggots, as a rule, do not penetrate other tissues. The principal flies that infect wounds, etc., are the flesh-fly (blue-bottle), blow-fly, screw-worm fly, and house-fly (qq.v.). Internal myiasis may result from swallowing the eggs of flies, when the resulting larvæ are got rid of by vomiting or purgation. Consult Howard, 'The Insect Book' (1901).

Mylitta, mĭ-lĭt'ta, an Assyrian goddess, identified by the Greeks with Aphrodite. She was, as goddess of the moon, the female principle of generation.

My'lodon, a genus of extinct edentate mammals, of sloth-like structure and large proportions, the ground sloths, the remains of which occur along with those of the Megatherium and Megalonyx, in the recent or post-Tertiary deposits of South America. In size the *Mylodon robustus* — the most familiar species — attained a length, in some instances, of 11 feet. See MEGATHERIUM.

Myna. See MINA-BIRD.

Myo'pia, nearsightedness. See SIGHT, DEFECTS OF.

Myosin, a proteid substance, usually classed as a globulin (see GLOBULINS), which separates from muscle plasma after death, in the form of a clot, which is analogous to the clot of fibrin that is formed under similar circumstances in blood. It does not exist in the living muscle, being there represented by two other proteids called myosinogen and paramyosinogen, respectively. The stiffening of the muscles after death (technically known as the "rigor mortis") is due to the formation of the myosin clots in the cells of the muscles.

Myoso'tis. See MOUSE-EAR.

Myriap'oda, a group formerly recognized among the arthropodan animals, but now known to be unnatural and hence abandoned. It included the groups of *Chilopoda,* or centipedes, and the *Diplopoda,* millepeds or galley-worms. The features common to all are the elongate worm-like body consisting of a head, and behind this the trunk of numerous similar leg-bearing segments, not divided into thorax and abdomen. Closer analysis shows that the chilopods are somewhat closely related to the true insects, while the diplopods form a distinct group of doubtful position. In the chilopods the head bears a pair of groups of simple eyes, a pair of antennæ and three pairs of jaws (mandibles, maxillæ, labium), while the first pair of trunk appendages becomes connected with the head and serve as poison-jaws. The trunk-segments are all similar, and each bears a pair of legs, the number of segments ranging from 15 to 170 or more. The body-segments are flattened and the reproductive openings are at the hinder end of the body. Most of the chilopoda are carnivorous. The most noticeable members of the group are the centipedes (*Scolopendridæ*) of the tropics, some of which are nearly a foot in length and have considerable poison powers. See CENTIPEDES.

In the diplopoda the head bears but two pairs of jaws (mandibles and lower lip or gnathochilarium), while the trunk-segments are usually circular in section, and each, except a few near the head, bears *two* pairs of legs, an exception to the otherwise universal rule among arthropoda of a pair of legs to a somite. The range of segments is even greater than in the chilopods, there being 9 in *Pauropoda* and 200 in some *Polyzoindæ.* The reproductive organs lie ventral to the intestine, and the external openings are a little behind the head. The *Diplopoda* live mostly upon decaying vegetation. For protection they rely upon the very thick and hard walls of the bodies, and in some species upon peculiar stink glands which open on the sides of the body. See MILLEPED.

The Myriapods appear in the Devonian rocks and they are found in all parts of the world to-day. Most of the American species are described in Bollman's 'Myriapods of America' (United States National Museum, 1893).

Myricin, a substance formed by the combination of palmitic acid with an organic radical known as "myricyl." It has the chemical formula $C_{46}H_{92}O_2$, and occurs in beeswax, forming the chief portion of that part of the wax which is insoluble in alcohol. Myricin melts at 162° F., is readily saponified by alcoholic potash, and may be obtained in the form of feathery crystals by deposition from its solution in ether.

Myr'ioscope, a variation of the kaleidoscope (q.v.). A square box has a sight-hole in front, and at the rear are two plane mirrors which are arranged at a suitable angle. On horizontal rollers is a piece of embroidered silk or other ornate fabric, which is moved by means of a crank-handle on one of the rollers. This causes a pretty display when the ornamental figures are multiplied and thrown into geometrical apposition.

Myristic Acid, an organic acid occurring in the form of a glyceryl ether in nutmeg butter, from which it may be prepared by saponification and subsequent distillation at a pressure materially below that of the atmosphere. It has the chemical formula $C_{14}H_{28}O_2$, and is insoluble in water. It is very soluble in hot alcohol, however, from which it separates, upon cooling, in the form of lustrous laminæ, melting at 129° F. A number of compounds of myristic acid with the metals are known, as well as several ethers and other organic compounds.

Myrmidons, mėr'mĭ-dŏnz, a former people on the southern borders of Thessaly, who accompanied Achilles to the Trojan war. They were said to have received their name from Myrmidon, a son of Zeus and Eurymedusa. They are said to have emigrated into Thessaly under the leadership of Peleus.

Myrob'olans, the dried fruits of various species of East Indian trees, all having more or less astringent properties. They are imported into Britain for dyers and tanners, especially the latter. The trees are of the genus *Terminalia,* order *Combretaceæ,* the chief being the belleric myrobolan (*T. bellerica*), and the chebulic (*T. chebulica*).

My'ron, Greek sculptor: b. Eleutheræ, a seaport of Bœotia, about 450 B.C. He was, along with Phidias and Polycletus, a pupil of Ageladas, the founder of the Peloponnesian school of sculpture, and made his renown at Athens as a versatile and masterly worker in bronze, silver, and every other art material. He executed statues of gods, heroes, and especially of athletes, many of which were set up in the temples at Delphi and Olympia. The most celebrated among them was that of swift-runner Ladas, and the Discobolus, or hurler of the discus, a work of art highly admired by the Romans, as is proved by the many Italian copies of it made in marble, the finest of which is that now in the Lancelotti Palace, Rome. On medals, basins, and reliefs there are still extant copies of his Athenian work, 'Athene throwing Away the Flute,' etc. A marble copy of his 'Marsyas' is in the Lateran Museum at Rome, and one in bronze is to be seen in the British Museum. He was equally successful in the representation of animals. His 'Cow' in the market at Athens was the subject of many a laudatory epigram and was brought to Rome in the time of Cicero. Myron gave a somewhat exaggerated slenderness to the human form, which he modeled with exquisite beauty and anatomical accuracy, but was not a master of facial expression.

Myrrh, a popular name for a gum resin produced by *Balsamodendron myrrha,* variously referred to the natural orders *Burseraceæ* and *Amyridaceæ;* also for a garden plant *Myrrhis odorata* of the natural order *Umbelliferæ.* The resin is obtained from Arabia and adjacent Africa from a small, prickly, stunted, gray-barked tree which bears few small denticulate leaves, and smooth, brown, egg-shaped drupes as large as currants. The drops, granules, or tears which in commerce are brown, red, or yellow, are at first rather oily, yellowish, and soft, becoming brittle with age. They have a pleasing balsamic odor and lasting, bitter, aromatic taste. From earliest times they have been used for making incense and other perfumes and have been reputed useful in medicine, especially for cleansing the mouth and sweetening the breath.

Myrrh, the garden plant, is also known as sweet cicely, which has been cultivated for ages as a sweet herb for flavoring salads and culinary preparations. It is little grown in the United States except by people of rather recent European ancestry.

Myrta'ceæ, a natural order of trees and shrubs, the myrtle family, comprising about 70 genera and more than 2,000 species widely distributed in warm climates but sparingly in temperate. It is one of the most important families of economic plants. Some of the species, such as pomegranate (*Punica granatum*), guava (*Psidium spp.*), luma and ugni (*Myrtus*) yield important fruits; some such as cloves (*Eugenia sp.*), allspice (*Pimenta*), furnish highly valued spices; and still others, especially species of *Eucalyptus,* are leading timber trees of the world. The species are characterized by simple, entire leaves generally dotted with glands; perfect flowers in racemes or sometimes cymes, and various kinds of fruits. The order is variously limited, some authors including as sub-orders certain groups ranked as orders by other botanists. As extended, the order includes nearly 3,000 species. See MYRTLE.

Myrtle, a popular name for several unrelated plants of which the following are probably the best known: Grape myrtle (*Lagerstræmia indica*) of the natural order *Lythraceæ;* running myrtle (*Vinca spp.*) of the order *Apocynaceæ;* sand myrtle (*Leiophyllum, spp.*) of the *Ericaceæ.* When unqualified the name generally refers to various species of Myrtus of the natural order *Myrtaceæ.* The common myrtle (*M. communis*) is an evergreen shrub native of the Mediterranean region and western Asia, whence it has been introduced into gardens throughout the warmer temperate climates of the world for its foliage and flowers. It was used in Greek festivals as sacred to Venus and as the symbol of beauty and youth. Its aromatic leaves and berries were formerly used in medicine and its bark in tanning, uses still made of them to some extent in southern Europe. The small leaved myrtle (*M. microphylla*), the luma (*M. luma*), and the Chilian guava (*M. ugni*) yield edible fruits, for which they are planted in South America and to some extent in California.

Myrtle Tree. See BEECH.

Mysia, mĭsh'ĭ-ạ, Asia Minor, a name anciently applied to a district which varied greatly in extent at different periods. The name first occurs in the legend of Telephus, who became king of Mysia. Under the Persian empire Mysia was the name of the section between Lydia on the south and the range of Ida on the north. It was united with the region on the north and with Lydia in forming a single satrapy. After the overthrow of the Persian empire by Alexander the Great, Mysia fell to Lysimachus (311 B.C.). Subsequently it formed part of the Græco-Syrian kingdom, then of the kingdom of Pergamus, and finally, in 133 B.C., was bequeathed with the rest of the kingdom of Pergamus, by Attalus III. to the Romans, by whom it was made a part of the province of Mysia. When the divisions of Asia Minor were settled under Augustus, the name of Mysia was given to the whole of the northwestern district, bounded on the north by the Propontis (Sea of Marmora), east by Bithynia and Phrygia, south by Lydia, and west by the Ægean Sea. Under the later empire Mysia was erected into a separate proconsular province, and received the name of Hellespontus.

Mysore, mī-sōr', or **Maisur,** mī-soor', India, (1) the capital of the native state of the same name, 250 miles west by south of Madras, in a valley 2,450 feet above sea-level,

dominated on the southeast by Chamundi Hill 1,040 feet higher, with a temple on its summit. Modern enterprise on European methods has greatly improved the town. The streets are broad and regular, the houses intermingled with trees and temples, and there are several fine modern public buildings, including the British Residency. The fort built in European style, and separated from the town by a promenade, encloses the Maharaja's palace, and the dwellings of his officials. Pop. (1901) 68,151.

(2) The native state ruled by a maharajah, is bounded north by Bombay and Madras, east, south, and west, by Madras and Coorg, and has an area of 27,936 square miles. Coffee plantations and gold mines are the chief sources of its wealth. The principal commercial centre is Bangalore (q.v.), the capital is Mysore, described above. After being impoverished under native administration, the British took charge from 1831 until 1881, when the state was restored to a representative of the old dynasty, trained in a British school. The state is now one of the most conspicuous examples in its government and general prosperity, of the success of this method. Pop. (1901) 5,538,-482.

Mysteries, in ancient history, were among the Greeks, and afterward also among the Romans, secret religious assemblies, in which no uninitiated person was permitted to take part. They originated at a very early period. They seem to have had a double object — first, that of handing down the traditions relating to the divinities in whose honor they were celebrated; and secondly, that of teaching and practising religious rites. The true value of the mysteries did not lie in dogmatic teaching, but in the moral improvement apparent in the votaries, in the comfort the rites gave in the present life, and the hopes they inspired for the world to come. The most important Greek mysteries were (1) the Eleusinian; (2) the Samothracian, which were celebrated in honor of the Cabiri in all the places where these divinities were worshipped. (3) The Dionysia, at Rome called Bacchanalia, which were celebrated in honor of Dionysus or Bacchus. These mysteries were of so licentious a character that they were first forbidden in Thebes, and afterward in all Greece, as prejudicial to the public peace and morals. This was likewise done in Italy by a decree of the Roman senate in 186 B.C. (See BACCHUS.) (4) The Orphic, consecrated to Dionysus Zagreus, the son of Zeus and Persephone. (See ORPHEUS.) See also MIRACLE PLAYS.

Mysteries of Udolpho, The, a famous romance by Mrs. Anne Radcliffe, published in 1795. Like the famous 'Castle of Otranto' of Horace Walpole, this story belongs to the school of lime-light fiction. Udolpho is a mediæval castle in the Apennines, where, during the 17th century, all sorts of dark dealings with the powers of evil are supposed to be carried on. Sheridan and Fox praised the book highly; the grave critic and poet-laureate Warton sat up all night to read it; Walter Scott thought that, even setting aside its breathless interest as a story, "its magnificence of landscape, and dignity of conception of character, secure it the palm"; while Mathias, the author of 'The Pursuits of Literature,' who knew more of Italian letters than any other man then in England, discourses on "the mighty magician of 'The Mysteries of Udolpho.'" It is marked by that "art of poetical landscape," which, according to Garnett, the author, "may almost be said to have introduced into the modern novel."

Mystery of Edwin Drood, The, an unfinished novel by Charles Dickens (q.v.), written in 1870. The story ceased at the sixth chapter and leaves a murder mystery unsolved.

Mystic Shrine, Ancient Arabic Order of Nobles of the, an order said to have been founded at Mecca. The American order is composed only of 33d degree Masons. The membership amounts to 68,000. See MASONIC FRATERNITY.

Mysticism, the theory of knowledge put forth by the mystics. This theory relates principally to the knowledge of God, and the capacity of the human soul to apprehend the existence and nature of the Supreme Being, independently of an external revelation or authoritative teaching. But mysticism was more than a merely intellectual movement; it implied the knowledge of God through the feelings and affections, so as to bring about a union between the human soul and God, in which the human soul should lose its own self-consciousness of God's existence. On this side mysticism seems sometimes to lapse into the pantheism of Spinoza.

Mysticism to some degree forms a part of every phase of experimental and devotional religion. We find traces of it in the first ages of Christianity. The Logos of Saint John is the manifestation of God to the human mind, which latter like a mirror (to use Saint Paul's metaphor) reflects "the light which lighteth every man that cometh into the world." Both Saint Peter and Saint Paul reveal themselves as mystics in this sense.

The first systematic mystics arose in Egypt. When the old mysticism of pagan cults had passed away, and the revival of a pseudo-Platonism had driven men to turn from dialectics or tradition to the intuitions of the individual soul for knowledge and illumination, monasticism and mysticism burst into flower, and every hermit cell became an oracle where the solitary looked into his own soul, saw God there, and spoke with Him face to face. In many cases mysticism was a reaction from slavish conformity to dogma, and the tediousness or bitterness of theological controversy. The earliest mystics, like the earliest monastics, arose in the centuries when the controversies on the Trinity, especially on the nature of the second and third persons of the Trinity, were being furiously carried on. This revolt was a claim made by the human mind for liberty and independence. The soul asserted the right, as it had the power, to know and apprehend God without the need of the Church's authoritative definition. This is the history of mystics in every religion and every age; the cast-iron formalism of Brahmanism met its defiance in the theories of Buddhism, and the Moslem literist who based everything on the sentences of the Koran drove some of the most devout and imaginative of the faithful into Sufistic mysticism. What Alexandrian mysticism was may be seen from the pseudo-Dionysian writings which exhibit an attempt to

combine Christianity and Platonism, with the object of raising the church in the minds of believers above the perturbations of ecclesiastical politics; and giving to the world a clear and independent insight into the profundities of religious truth without subjecting the soul to the tyranny or narrowness of dogma. From the writings of the pseudo-Dionysius, and the teaching of his predecessors which they embodied, mysticism was planted deep in the bosom of the Christian Church. The Alexandrian made a clear distinction between a cold rational and intellectual knowledge of God by intuition and feeling. No man he declares can have an absolute knowledge of God in thought, for God is infinite and the mind finite; human knowledge is relative; the human soul can reflect, be united with, and lost in God in the ecstasy of supreme devotion, and this dictum has been re-echoed by all the mystics from Saint Bernard to John Wesley.

Neo-Platonism.— The crucial point in all theories of knowledge is that at which Platonism, the doctrine of intuition, and Aristotelianism, the doctrine of reason, become confronted. When dialectic was introduced to define the nature of God (as in the early controversies of the Church), Neo-Platonism sprang to life with another solution. External causes, such as the breach in the barrier between Eastern nations and Europe wrought by the conquests of Alexander, as well as the triumph of Christianity over Greek and Roman religions, had necessitated this phase of religious and philosophical speculation. Moses, Plato, Zoroaster and Christ were brought into conjunction, and the result was the mysticism known as Neo-Platonism. Like all other forms of Christian mysticism it was a sort of esoteric Christianity. Its fundamental theory was that man the subject, and God the object, were by a subjective intuition, ecstasy, so to be united as to lose their separate identity.

Oriental Mysticism.— The mysticism of India must be considered under two heads, those of Brahmanism and Buddhism. Brahmanism is practically a polytheistic religion with an elaborate ritual, and a detailed ascetic code. (See HINDUISM.) The learned Brahmans, however, have a certain system of their own, which must be called esoteric Brahmanism. This is a form of mysticism, whose essence is pure contemplation. To the esoteric Brahman all religious exercises, all ceremonial observances, the frequenting of temples, even the giving of alms, are of no avail in bringing the soul nearer to God without contemplation which results in the absorption of the individual human soul in the universal soul. This conviction made a way for the propagation of Buddhism. The Buddhist believes neither in the existence of a human soul, nor of a God; but he is a mystic in that he places the source of salvation in the subjective mood of each individual. Hence his Four Great Truths, namely, (1) That misery always follows existence; (2) That all modes of existence always result from passion or desire; (3) That there is no escape from existence excepting by the destruction of passion or desire; (4) That this may be accomplished by following the fourfold way to Nirvana. These four stages or paths of which the first is an awakening to the hollowness of life and a recognition of their need for the guidance of the Enlightened One (Buddha). The second Path is reached by liberation from the passions of lust and revenge. He enters the third Path by becoming free from evil desires, doubt, ignorance, heresy and attaining good will toward all living beings. The fourth Path is Nirvana (q.v.) which, however, cannot be attained to in this life. (See BUDDHISM.)

Mohammedan Mysticism.— The mystical theology which grew up in the midst of Islam is called Sufism (q.v.), a system which is practically a sort of humanistic pantheism. According to Sufistic teachings nothing exists actually but God. Man is like a stream that flows from one source, the Deity. The soul of man is separated from God as wax is from honey, as the plant from its nourishing soil. Yet reunion is possible. The four degrees or paths of approach are (1) Shariat, ascetism; (2) Tarikat, yearning; (3) Hakikal, contemplation; (4) Soul union with God. The Sufis neglect all worship and ritual and in their poetry and romance earthly symbols are employed to express deep spiritual truths.

Christian Mysticism in Europe.— Scotus Erigena translated the Greek treatise of pseudo-Dionysius in the 9th century. The work was widely circulated, and made many disciples. Among the famous mystics of the Middle Ages were Saint Catharine of Sienna and Saint Brigitta, whose visions were all the outcome of the devout contemplation exemplified in the Egyptian monastics. As in Alexandria the vagaries of the mystic led him into revolt against the dogmas of the church, which denounced as heretical the teeming sects that came from mystical Gnostic and Manichæan ancestry, so was it with the Paulicians (q.v.) of the 7th century and the Cathari (q.v.) whose communities multiplied so widely in Europe. But it was not yet time for the mystics to act on the offensive. The first important occasion when the representatives of Christian dogma as implied in scholasticism, came into conflict was in the famous controversy between Saint Bernard of Clairvaux, and Peter Abélard. The charge made by Bernard was: «Peter Abélard makes void the whole Christian faith by attempting to comprehend the nature of God by human reason.» These words are an echo of the Alexandrian mystic whom we have already quoted. When Bernard and Abélard, in the 12th century, crossed swords on this question, and the mystic was supported and the scholastic condemned by the decree of Pope Innocent II., the controversies of Europe had taken that direction, which could only end in the uprising of a man like Luther. Bernard's mysticism was of a practical kind. He states there are three stages in the knowledge of God. By abstraction from earthly things, the mind is able to rise to the vision of the divine nature. Those, who by asceticism become dead to the body, are granted that ecstatic vision in which Saint Paul was caught up into heaven. The highest stage is when self-love is lost in love of God, and we ourselves are absorbed into the deity, «as the little drop of water falling into a vast measure of wine seems to lose its own nature entirely, and to partake of the taste and color of the wine.»

Scotus Erigena's translation of the writings of the pseudo-Dionysius made a profound impression in France. The Augustinian mon-

astery of St. Victor at Paris became a famous home of mysticism in the 12th and 13th centuries. The chief of the Victorines, as these mystics were called, were Hugo of Saint Victor (1096–1144), his pupil, Richard of Saint Victor, and Walter of Saint Victor. They all made war on scholasticism, saying that the objects of mystic contemplation are partly above reason and partly contrary to it. The crown was set to their system by Bonaventura (1221–74), who, in his 'Itinerarium mentis ad Deum' (The Mind's Guide Book in the Path of God), gives a detailed account of various stages in mystical perfection, intuition, ecstacy, and union with God.

Religious formalism and dogmatic literalism in the 12th and 13th centuries in Germany and the Netherlands were met by the protest of many mystical sects, including the Begherds and the Beguines. The Dominican and Franciscan orders founded in the 13th century were an outcome of a like longing to maintain and spread a more personal and emotional type of religious experience. There rose many female saints and visionaries, chief among whom was Elizabeth of Hungary. Joachim of Floris, an Italian mystic, published his prophetic gospel, in which he announced that the Kingdom of the Father and the Son had passed and the Kingdom of the Holy Spirit was to open upon the world in 1260. The doctrines of the New Spirit, a system of mystical pantheism founded on the writings of Erigena spread widely in the valley of the Rhine during the 14th century. But the greatest of European speculative mystics was Eckhart (1260–1329), summing up his teaching in the words, "The eye with which I see God is the same eye with which God sees me. My eye and God's eye are one; one vision; one recognition; one love." The followers of Eckhart formed themselves into the society known as the "Friends of God." Such was John Tauler of Strasburg. He was exceedingly eloquent as a preacher and the most influential religious teacher in Germany in his day. Tauler's 'Deutsche Theologie' was afterward published by Luther and exercised a great influence on the mind and life of that reformer. There were many Christian brotherhoods formed by mystics who took no monastic vows, the most famous of which was that at Deventer, the "Brethren of a Common Lot," of which Thomas à Kempis (1380–1471) was a member. Later German mystics were Thomas Munzer, in whom mysticism developed into the widest fanaticism, and ended in the atrocities of the Peasants' war. Mysticism in Jakob Boehme (1575–1624) lost some of its peculiar religious and emotional character and became more widely speculative — a philosophy or a theosophy, rather than a devotional school of religious thought.

Among post-Reformation mystics must be mentioned the devoted and ecstatic founder of the Discalced Carmelites, Santa Teresa (1515–82) and her ally Saint John of the Cross. Saint Francis de Sales (1567–1622) still exercises a powerful influence through his exquisitely tender and spiritual counsels. In the case of Madam Guyon (1648–1717) "quietism" and "passive prayer" were developed to their most extravagant manifestations; yet she had many disciples, and her religious notions were once approved of by Fénelon, though the more robust minded and acute Bossuet stoutly opposed them. In England the Cambridge Platonists of the 17th century must be called mystics, though not in the same sense as George Fox, founder of Quakerism, and William Law, translator of Jakob Boehme.

Present-day Forms of Mysticism.— Mysticism in modern times has grown up side by side with agnosticism and materialistic monism. It takes the form of theosophy, esoteric Buddhism, and there are some traces of a true mysticism in so-called Christian Science. These forms of mysticism have thousands of adherents, they form large organizations and have originated a large and growing literature of their own. A more philosophical form of mysticism is the doctrine of the Neo-Hegelians which first came to light in England, but has roused much interest in the United States and Germany. In literature we find traces of Neo-Platonism in Browning's theory of knowledge, while Emerson is a mystic who exhibits wide affinities with eastern as well as western schools of thought. See NEO-PLATONISM; PLOTINUS; PHILO JUDÆUS; PORPHYRY.

Consult: Vaughan, 'Hours with the Mystics'; Preger, 'Geschichte der Deutschen Mystiker'; Jundt, 'Histoire du Panthéisme Populaire.'

Mytens, mī'tĕnz, **Daniel,** Dutch painter: b. The Hague about 1590; d. Holland 1642. He went to London, England, and was welcomed at the court of James I.; he was appointed painter royal by Charles I. and was much favored by the king and aristocracy. Many of his portraits, which are bold and spirited in conception, broad in treatment, and of admirable color, are in Hampton Court. When Van Dyck came to England he gradually eclipsed in royal favor the glory of his predecessor, who returned to Holland.

Myth, a general name for certain kinds of folk-lore stories, historic tales, etc., differing from fable (q.v.) and from legend (q.v.). See MYTHOLOGY.

Myth'ical Islands, imaginary islands described in popular fable, romance, and song, supposed to have existed in all ages in the several oceans of the world. The lost Atlantis was first mentioned by Plato. The Islands of the Blessed were creations of the Greeks. The fairy isle of Avalon is a feature of Celtic mythology, as was also the mythical land of Saint Brendan.

Mytho, Mitho, or **Mito,** French Indo-China, a town of Cochin-China, on the northernmost branch of the Me-Kong delta, 58 miles by rail southwest of Saigon. Mytho is an important trading centre for the produce of Cambodia and Annam, and the railway from Saigon was the first built in the country. Pop. 30,000.

Mythol'ogy, from the Greek *muthos* or *mythus,* a tale or fable, and *logos,* a discourse. This is a collective name for the entire body of fables, legends, myths, and traditions, that arise in the earliest periods of a nation's existence and of its civilization, and which embody the convictions of the people among whom such fables arise as to their gods or other divine personages, their origin and early history, and the heroes connected with it. Such fabulous narratives seem to grow up naturally among all early peoples, and are found among the ruder races at the present day, but the mytholo-

gies which have been most studied, and the tales belonging to which are best known, are those of ancient Greece and Rome, Scandinavia, the Hindus, and ancient Egypt. Though speculations as to the origin of mythology have been put forth from a very early period, it is only in recent times, by the help of comparative philology, and by comparing together the myths of different peoples (comparative mythology), that any real advance has been made, and the study of mythology placed upon a scientific basis. The mythologies of Greece and India have been most fruitful for this purpose, and that of Greece in particular must always be largely drawn upon in any exposition of the results arrived at by modern investigators. Myths are of course believed in by the bulk of the people among whom they are current, and it is only when speculative and reflective spirits arise, and when science and philosophy have made some advances, that their truth is called in question.

Classification.— It is difficult to find a general theory which will explain the origin of all myths, for though we may admit that many, perhaps most, of them are physical in origin, it is impossible to deny that others may be pure fabrications, tales invented by early bards or minstrels to beguile a weary hour, while in others fragments of real history may be hidden. To decide what class any myth is to be referred to, we must trace it, if possible, back to its earliest and most rudimentary form, and then, by the aid of the science of language, we may be able to say whether it is physical in origin, or not; but as this will in many cases be impossible, there must remain a number of myths whose origin cannot be settled.

Greek.— Among the Greeks there was a method or system of interpretating myths and mythological deities, by which they are regarded as deifications of dead heroes and poetical exaggerations of real histories. This was the belief or philosophy of Euhemerus, a Greek philosopher, whose method or system has been called Euhemerism. By disciples of this school, Jupiter is said to have been an ancient ruler of Crete; Æolus (the god of the winds), a skilful mariner; Atlas, a great astronomer, and so on. The Euhemeristic school is not even yet extinct, and at the present day it includes some who find in the sacred Scriptures prototypes of mythological personages. Zeus, Apollo, Athene, Heracles, and the other divinities of ancient Greece, were believed by the bulk of the people to have a real existence, and the stories regarding them were looked on as true; but even in Greece in early times the absurdities and monstrosities of some of the myths led to attempts at explaining the stories in such a way as that they should not shock common sense or moral feeling. By some authors the stories that represent the gods as guilty of gross immorality, as impure, cruel, and deceitful, were flatly denied, and those authors in whose writings such stories are found were accused of having invented them themselves. Homer and Hesiod were severely censured by Xenophanes and Heraclitus on this account; and Plato would not endure the idea that the Homeric poems should be admitted into his ideal republic.

Hindu.— Prominent among the Hindu myths we find the sky god Dyaus (from *dyu*, to shine), whose name, however, always retained its meaning of sky, so that Dyaus had only an indistinct personality as a deity. Dyaus is the same as Zeus, and also the same as the *Ju* of the Roman Jupiter, the latter part of this name signifying simply father. The Hindu Varuna, a sky god, is conceivably the same as the Greek Ouranos, which word, besides being the name of a deity, had the ordinary signification of sky or heaven. The Vedic god Indra again, whose name is derived from *indu*, Sanskrit drop or sap, and therefore would mean the giver of rain, corresponds closely to Zeus in his attributes; like him, and like the Norse god Thor, he is the wielder of the thunderbolt. So the bright Vedic goddess Ushas, the dawn, is the Greek Eos, the dawn; while Ahana, another name for the dawn, is the Greek Athene.

Scandinavian.— The mythology of the North European people include folk-lore tales and the like of Denmark, Norway, Sweden and Iceland. Among the gods of the north are Thor, god of thunder, the strongest of gods and mortals, whose hammer, Miölnir, crushes the hardest objects, and Baldur, the youthful and beautiful god of eloquence. Niord is the god of winds, of sailors, of commerce, and of riches; his son Frei is the ruler of the sun, and on him depend rain and sunshine, plenty or dearth. Freya is the goddess of love. The mildest and most bountiful of the gods, she is a friend of sweet song, and loves to hear the prayers of mortals. Tyr, a son of Odin, the fearless god, who wounds by a look, is lofty as a fir, and brandishes the lightnings of battle. He is not properly the god of war, but rather of power and valor. His brother Braga is the god of wisdom and poetry. Braga's wife is Iduna, who preserves the apples of immortality, which she offers in vessels of gold to the heroes at their entrance into Valhalla. The Valkyrias or "choosers of the slain" are awful and beautiful beings, neither daughters of heaven nor of hell. Mounted on swift horses, they conducted the heroes to Valhalla. Another striking figure is Loki, as beautiful as he is malignant. By the giantess Angerbode he had Hela, the goddess of the lower regions, the wolf Fenrir, and the terrible serpent of Midgard, Jormungandur, which surrounds the whole earth. Hela rules in Niflheim. All who die of sickness and old age, and not in war, descend to her dark mansion. Other mythical personages were the Norns or fates, and Heimdall, who keeps watch on the bridge Bifröst. The popular belief was all would perish in a final crash of doom.

Indians and Savages.— Andrew Lang, the English student of mythology, declares that he finds a key to mythology in the study of the myths and mental habits of savage races. He maintains that "the savage and senseless element in mythology is for the most part a legacy from ancestors of the civilized races who were in an intellectual state not higher than that of Australians, Bushmen, American Indians, the lower races of South America, and other worse than barbaric peoples," and that the monstrous myths current in Greece, Egypt, and India were thus inherited. He points to the currency of such myths among savages at the present day, and to the fact that in general savages are eager to arrive at some explanation of the natural phenomena around them, and are quite satisfied with explanations that to civilized men may

seem even imbecile. When a phenomenon presents itself the savage requires an explanation, and that explanation he makes for himself or receives from tradition in the shape of a myth.

Bibliography.— Cox, 'Tales of Ancient Grimm,' 'Teutonic Mythology' (1889); Lang, 'Custom and Myth' (1884); Lang, 'Myth, Ritual and Religion' (1887); Lang, fairy books of various dates; Müller, 'Lectures on the Science of Language' (1897); and various works on Folk-lore.

Mytile'ne. See MITYLENE.

Myxœde'ma, a cretinoid state appearing in adult life, presenting many nutritive changes, and especially a solid œdema in the subcutaneous tissues. Its cause is a loss of function of the thyroid gland (q.v.), and a resulting diminution in the supply of its secretion to the blood. It is strictly a fibrosis of the thyroid. The disease was first described by Sir William Gull of London in 1893. A similar condition results from removal of the gland by operation. Women are the principal sufferers, furnishing 80 per cent of the cases. Myxœdema is found in cold climates, and probably most frequently in Europe; in certain districts it appears to be endemic. The onset of the disease is gradual, and the symptoms are loss of activity, sensitiveness to cold, falling of the hair, decay of teeth and nails, rough, dry skin, spongy gums, diminution of perspiration, yellow tint and swelling of the face, paleness of the mucous membrane, subnormal temperature, constipation, albuminuria, impairment of sight and hearing, headache, slow intellection, hallucinations and, in some cases, insanity. But the most noticeable symptom is the solid œdema, which develops principally in the loose subcutaneous tissues, appearing like a considerable swelling. The face, the back of the hands, and the upper limbs first present enlargement; but in time it involves the whole body. The thickening and enlargement of the face renders the patient unrecognizable.

Treatment consists in the administration of thyroid gland and of tonics. Grafting of a partial or entire thyroid gland taken from an animal into the subcutaneous tissue has been very successful. Internally a glycerine extract of sheep's thyroid is given, or a dry extract, or an emulsion may be made and used hypodermically. This treatment was first suggested by Murray, of Newcastle-upon-Tyne, in 1891. The remedy must be used cautiously, especially if cardiac or vascular disease exists. Thyroid may cause vomiting, diarrhœa, fever, profuse perspiration, headache, glandular swellings, and prostration. The dose should be graduated so as to avoid these symptoms of poisoning. After many months of treatment the disease disappears. The dose should then be diminished, but the patient must continue to take thyroid all her life, lest the myxœdema return. (See CRETINISM; THYROID GLAND.) Consult Gull, 'On a Cretinoid State Supervening in Adult Life in Women,' in Clinical Society's 'Transactions' (London, 1874); Gimlette, 'Myxœdema and the Thyroid Gland' (London, 1895); Murray, 'Diseases of the Thyroid Gland,' in 'Twentieth Century Practice,' Vol. IV. (New York, 1895).

N

N the fourteenth letter of the English and several other alphabets, is classed as a dental-nasal consonant: it is pronounced when a voiced sound is emitted through the nose while the tip of the tongue is in contact either with the front upper teeth or with the front of the palate: the position of the tongue, whether touching the teeth or the palate, distinguishes the n of one language from that of another: the n of English speech is produced by placing the point of the tongue against the palate just behind the gums. When n is followed by a guttural either the n and the guttural form one nasal sound, as in ring, or the n becomes distinctly nasal and the guttural retains its own sound-value, as in rink; but when the n and the guttural belong to different syllables, as in the words engage, include, concave, unkind, the n usually retains its pure sound; yet the rule has many exceptions recognized by orthoepists, who while they regard the n of syncarpy, syncretist, as pure, mark the n of syncope and many other words as nasal, equal to ng. In words ending with n preceded immediately by l or m, the n is silent: kiln, hymn; in the beginning of a word a consonant preceding n is silent: know, gneiss, mnemonic, pneumatic. In many words is seen an intrusive n, as in passenger, messenger, though the words from which these are formed, passage, message, have no n. The initial n of newt, nickname, and a few other words is the n of the indefinite article which became inseparably attached to ewt, ekename, etc.; conversely, by dropping the initial n the forms nadder, nauger, napron became adder, auger, apron.

N. D'Anvers, dăn'vèrz. See BELL NANCY R.E.M.

N-Rays, a new form of radiation discovered by M. Blondlot. He uses the term N-rays to designate the new radiation, the name being suggested by the University of Nancy, where he conducted his experiments. One of the important properties of N-rays, is that they can be reflected and refracted while they have penetrative powers similar to Röntgen rays. They do not, however, affect a photographic plate and are, of course, invisible. But when a screen has been devised which will render them visible, it will then be possible to obtain perspective images of hidden bodies, such as a diseased bone, and this will give these rays as great an advantage over the X-rays as the photograph has over the old black-and-white silhouette. Another fact connected with N-rays has been discovered by Blondlot, and since confirmed by Reubens, which may prove to be of great importance in another field of application. This is the fact that these rays enhance the luminosity of a glowing solid or gas without increasing its temperature. The explanation of this effect has not yet been offered, but any means which will enable us to increase the luminosity of a body without increasing its temperature promises to be of great importance in solving the problem of an efficient light.

Naar, David, American journalist and politician: b. St. Thomas, W. I., 6 Nov. 1800; d. Trenton, N. J., 1880. He entered into mercantile business with his father and brothers in New York, later removed to Elizabeth, N. J., in 1844 was elected a member of the New Jersey Constitutional Convention, and was appointed in the same year by President Polk United States consul to St. Thomas. He returned in 1848 and was elected mayor of Elizabeth. In 1853 he removed to Trenton, N. J., where he took charge of the 'True American,' a journal which he soon raised to a position of influence. In 1864 he was elected State treasurer and retired from his paper in 1866.

Na'bal, in Biblical history, the name of an Israelite of the tribe of Judah. David, having afforded protection to Nabal and saved his flocks and herds, his property, and even his life when in danger, some time after sent to him to supply his troops with provisions. This Nabal refused; on which David, stung with the ingratitude of the man, vowed to take summary justice on the ungrateful Jew and exterminate his family; and taking with him 400 men, set out for the residence of the mercenary Hebrew. Abigail, Nabal's wife, hearing of her husband's conduct and David's resolve, collected such provisions as the army required, and, attended by a train of servants, set out to meet the approaching king. Her beautiful person, combined with the excuses she made for her husband's conduct, so softened the heart of David, that he accepted her gifts, averted his wrath, and Nabal having been "smitten by the Lord" a few days after, David married his widow.

Nabatæ'ans, năb-ạ-tē'ạnz, a Semitic race of people who from the 4th century B.C. to about 100 A.D. held a position of importance in Arabia and adjacent regions. They were ruled by kings; their capital was Petra (q.v.), and they carried on a great caravan trade. Their language was Aramaic.

Nabayugan, nä-bā-yoo'gän, a tribe of the Philippines living in the province of Cagayàn, Luzon, west of Malanec. They are a warlike, head-hunting people, of Malay origin, and apparently related to the Guinaanes.

Na'bob, The, a novel by Alphonse Daudet, published in 1877. This is one of the most highly finished of the author's works. It is a romance of manners and observation; and it

blends successfully many of the qualities of both the naturalist and the romantic schools.

Nabonassar, năb ō năs'ar, **Era of.** See BABYLONIA; NEBUCHADNEZZAR.

Nabonidus, nab-ō-nī'dŭs, or **Nabonadius** (Babyl. *Nebûna'id*), last king of Babylon (555-38 B.C.). He was elevated to the throne by his fellow conspirators in the murder of Prince Labossoracus (or Laborosoachard). Soon after his accession he concluded with Lydia and Egypt an offensive and defensive alliance against the Persians under Cyrus. He then greatly strengthened the defenses of his capital. It was not, however, until 539 B.C. that Cyrus, who had already defeated the impetuous Crœsus, marched upon Babylon. Nabonidus followed the traditional Oriental strategy in opposing his foe. He fought a battle within sight of Babylon, was utterly defeated, and then, while most of his army found safety within the great walls, he himself with a small force entered Borsippa, an important town southwest of Babylon; possibly hoping by this movement to force Cyrus to divide the Persian host. His stepson, Belshazzar (Bil-shar-uzur), familiar through the scriptural narrative in Daniel, and apparently co-sovereign, conducted the defense of Babylon. After the fall of the capital, Nabonidus surrendered, was kindly treated by Cyrus, and even made governor of the province of Carmania. Some of his inscriptions show that he was a personage of historical interest. See BELSHAZZAR; CYRUS.

Nabopolassar, nă-bō-pō-läs'sar, Babylonian king, founder of the New Babylonian empire. He was a Chaldæan, not of the kingly line, and erected an independent kingdom in Chaldæa in the second quarter of the 7th century B.C., thence extending his power to Babylon about 626. With his ally, Cyaxares of Media, he conquered Nineveh about 606, and died soon afterward, leaving the empire to Nebuchadnezzar, his son. Nabopolassar improved the irrigation of the country round Babylon and did much to beautify the city. Consult Rogers, 'History of Babylonia and Assyria' (1900).

Na'both, an Israelite, owner of a plot of ground in Jezreel, during the reign of Ahab, king of Israel, about 897 B.C. This plot lay on the eastern slope of the hill of Gilboa, and in addition to this he owned a vineyard. The palace of Ahab immediately adjoined this vineyard, which became an object of the king's desire and he offered to purchase it or give another in exchange for it. When Naboth refused to part with the "inheritance of his fathers," Ahab was bitterly disappointed, but his wife sent a warrant in Ahab's name, sealed it with his signet and caused Naboth to be apprehended, brought to Samaria, tried for blasphemy and treason on the testimony of two suborned witnesses, and stoned to death with his sons. Their mangled remains were devoured by the dogs and swine and the blood from their wounds ran down into the large tank or reservoir which still is seen on the slope of Samaria. This crime brought down the curse of Elijah upon the guilty couple (2 Kings ix. 2–26), which was fulfilled soon after in the fate of both. See AHAB, JEZEBEL.

Na'bu. See NEBO, MOUNT.

Nabua, nä'bwä, Philippines, a pueblo of the province of Ambos Camarines, island of Luzon, situated in the southern part of the province, on the Buhi River, 20 miles southeast of Nueva Cáceres. It is in a marshy region where rice is grown, and is connected with the neighboring towns by a good road. It is a military and telegraph station. Pop. 17,800.

Nabuco de Araujo, nä-boo'sō dā ä-row'-hoo, **José Tito,** Brazilian dramatist: b. Rio Janeiro, Brazil, 4 Jan. 1836. He served as provincial deputy in the magistracy and was for many years district attorney of Rio Janeiro, but resigned in 1879 and retired to private life. His work as a dramatist is well known in South American cities, where it has been successfully presented. He has published: 'O Filho do Acaso'; 'Biographia de Lamartine' (1877); 'Historia e Vida do General Gurjão' (1878); 'Poesias' (1879); etc.

Nabulus, nä-boo-loos', or **Nablus,** näb-loos', Palestine, the ancient Schechem, and one of the chief cities of Samaria, 30 miles north of Jerusalem, on the highest part of the fertile and fruitful pass between Mounts Ebal and Gerizim, leading from the Mediterranean to the Jordan. It is a busy trading and industrial centre, the seat of a governor, the see of a Greek bishop, and is visited by great numbers of pilgrims attracted by the tombs of Joshua and Joseph, Jacob's Well, and the Tree of the Sanctuary, three miles south on the road to Jerusalem. As a Canaanite city it was destroyed by Abimelech, a son of Gideon the judge. Rehoboam was crowned king of Israel here, and during the Greek occupation Justin Martyr was born here. It figured conspicuously during the crusades. It was the religious centre of the Samaritans (q.v.), whose descendants inhabit the southwest quarter of the town. Pop. est. 20,000.

Nachi (nä'chē) **Indians.** See CREEKS.

Nachtigal, näH'tē-gäl, **Gustav,** German explorer in Africa: b. Stendal 23 Feb. 1834; d. at sea near Cape Palmas 19 April 1885. He studied medicine; became a military surgeon; in 1861 went to Algiers; in 1863 became surgeon to the army of the Bey of Tunis; and in 1868 was sent with presents from the king of Prussia to Sultan Omar of Bornu in recognition of kindness shown to German explorers. His journey through Tibbu and Tibesti was over country hitherto untraversed by a European. He arrived at Kuka in 1870, thence explored Borku, Kanem, and the country south of Bornu, and on his way back to Cairo passed through Wadai. The years from 1875 to 1882 he spent in Germany arousing national interest in German colonization. He entered the consular service in 1882, becoming consul to Tunis, and in 1884 was German commissioner for the annexation of Togoland, Kamerun, and Lüderitzland. He died on his way back to Europe. Nachtigal's work marked a distinct era in the exploration of northern Africa, and even more notably in German colonial policy. He wrote 'Sahara und Sudan' (1879–89). His letters are collected in Berlin, 'Erinnerungen an Gustav Nachtigal' (1887). Consult also the life by Ruhle (1892).

Nacogdoches, năk-ō-dō'chĕz, Texas, city, county-seat of Nacogdoches County; on the Texas & N. O., the Houston, and the East & W. T. R.R.'s; about 120 miles north by west of Beaumont and 130 miles north by east of Hous-

ton. It is in a rich agricultural region, in which the chief products are cotton and tobacco. A government experiment station for testing the tobacco is located here. The industrial interests of the city, outside the government station, are connected chiefly with the preparation of cotton and tobacco for market.

Nacogdoches was first settled by Spaniards in the early part of the 18th century; it was first a mission, the headquarters for the converted Indians of the surrounding region. Pop. (1890) 1,138; (1900) 1,827.

Nacré. See MOTHER OF PEARL.

Nacrite, a class of white unctuous minerals possessing a pearly shining lustre. They are usually found with mica slate, and also occur native in granite, crystallizing in four-sided prisms. The constituents are usually alumina 28.844, silica 64.440, with varying portions of lime and the protoxides of iron and manganese. Nacrite is found in various localities, notably near Brunswick, Maine, and in some parts of Ireland.

Nadal', Ehrman Syme, American author: b. Lewisburg, W. Va., 13 Feb. 1843. He was graduated from Yale in 1864 and was a secretary of the United States legation at London, 1870–1 and 1877–84. He has published 'Impressions of London Social Life' (1875); 'Essays at Home and Elsewhere' (1882); 'Zweibach, or Notes of a Professional Exile' (1895).

Nadchés Indians. See CREEKS.

Na'den, Constance Caroline Woodhill, English poet: b. Edgbaston, Birmingham, 24 Jan. 1858; d. London 22 Oct. 1889. She studied at the Mason College, Birmingham, in 1881–7; became interested in sociological problems, and lectured with effect. She was an investigator of Spencer's system of philosophy, and became the advocate of a doctrine, taught also by Dr. R. Lewins, called 'Hylo-Idealism,' an attempt to furnish a metaphysical system reconciled with the science of modern times. She is chiefly remembered for her volumes of 'Songs and Sonnets of Springtime' (1881), and 'A Modern Apostle and Other Poems' (1887). The poems were commended for their promise by Gladstone in a review in the 'Speaker.'

Nadia, nā'dē ā, or **Nud'dea,** India, a town and district of Bengal: (1) the town, capital of the district, on the Bhagirathi River, 63 miles north of Calcutta, is a place of sanctity, the seat of native Sanskrit schools, and was the residence of the last independent Hindu king of Bengal in 1203. Pop. (1901) 14,105; (2) the district has an area of 2,982 square miles. The Ganges here known as the Padna skirts its northeastern boundary and from it branch the three "Nadia rivers," the Bhagirathi, Jalangi, and Matabhanga, which irrigate the district and are valuable thoroughfares for communication and trade. Pop. (1901) 1,667,990.

Na'dir, in astronomy, that point of the heavens which is diametrically opposite to the zenith, or point directly over our heads. The zenith and nadir are the two poles of the horizon; the zenith, nadir and centre of the earth are in one straight line.

Nadir Shah, nā'dēr shā, or **Tamasp Kuli Khan,** king of Persia: b. Khorasan 1688; d. Fethabad 19 June 1747. He was of Turkish blood and poor family; early showed his cunning by his attempts, while in the service of different governors of Khorasan to get this province for himself, but was unsuccessful. Putting himself at the head of a band of robbers he got possession of several strongholds in Khorasan; and in 1726 entered the service of Tamasp II., for whom he checked the Afghans and defeated the Turks, and from whom he received four provinces. When Tamasp was defeated at Hamadan by the Pasha of Bagdad and was forced to cede the provinces on the Arauxis to the Turks and to make a disgraceful peace, Nadir dethroned him, put his son Abbas III. in his place and took the regency upon himself. The lost provinces were won back from the Turks and in 1736 upon the death of Abbas Nadir came to the throne, invaded Afghanistan and conquered it, took most of India from the grand mogul Mohammed XIV., pillaged Delhi, and was everywhere so successful that his empire reached from the Indus and Oxus to the Euphrates and Caspian. He made peace with the Turks in 1746, but was assassinated by the officers of his guard, who were weary of his brutal cruelty. Consult Maynard, 'Nadir Shah' (1885).

Naegele, nā'gē-lē, **Charles Frederick,** American painter: b. Knoxville, Tenn., 8 May 1857. He studied figure and portrait painting under C. Myles Collier, William Sartain, and William M. Chase in New York. He has received many awards in competitive exhibitions and has painted portraits of Peter Cooper, Charles L. Tiffany, ex-Governor Roswell P. Flower, General Joseph D. Bryant, General Edwin A. McAlpin, John W. Gates, William Woodward Junior, Franklin V. Edson, and Waldo Hutchins.

Næ'nia, or **Nenia** (Latin), a funeral song among the ancients, sung generally by women. Nænia was also the goddess of lamentation.

Nævius, nē'vī-ŭs, **Gneius,** early Roman poet: b. probably in Campania between 274 and 264 B.C.; d. Utica, Africa, 204 B.C. or 202 B.C. He wrote in the old Saturnian verse an epic on the first Punic war; but was better known as a dramatic writer, particularly for his comedies. Most of his plays, of which the earliest was produced in 235 B.C., were translations or adaptations from the Greek. His attacks on the Metelli, of the Roman nobility, provoked their anger, and he was banished from the city, and retired to Utica. Fragments only of his works have come down to us. These have been edited by Klussmann, Vahlen, and most recently by Ribbeck ('Fragmenta Scænicorum Romanorum').

Næ'vus, a birth-mark or mother's mark. This disfigurement, which occurs most frequently on the head and trunk, but may also appear on the extremities, is essentially an enlargement of the minute veins, or venous capillaries, which are dilated, and anastomose or unite among themselves to form a vascular patch generally of a deep-red color. The lesion is confined to the upper layer of the true skin. No pulsations are observable in the nævus, but if the circulation in the neighborhood is obstructed in any way, turgescence is seen, and the color deepens. The familiar name of "mother's mark," or "longing mark," is applied

to nævus from a former belief that the lesion was the result of fear, fright, unnatural longing, or some such irritation acting upon the mother's constitution, and communicating its effects to the unborn child, in the shape of this mark. Nævus, apart from questions as to its exact cause, appears to be invariably congenital in its nature, and never to occur as a result of disease or accident. After birth it usually enlarges, and after attaining a certain size may remain to constitute a permanent lesion, or it may be absorbed with or without inflammatory action. Nævus has been treated in various ways, by excision with the knife, ligature, caustics, etc. The ligature has until recently been most commonly employed for its removal, threads being passed under the base of the nævus, and tied so as to produce strangulation of the vessels. Electropuncture and electrolysis are now much used, the latter being, where practicable, the best of all discovered means. In cases where a nævus is of limited extent, and does not produce disfigurement, or where from its situation it may not be seen at all in ordinary circumstances, the surgeon's advice generally is to let it alone. In subcutaneous nævus the lesion is more deeply seated. Subcutaneous nævus generally accompanies the more superficial form, but may bleed spontaneously, and weaken the patient unless removed.

Nafa, nä'fä, **Naba,** or **Nava,** Japan, the principal seaport town of the Liu-Kiu Islands, on Okinawa. It is on the west coast of the island, and carries on a considerable export trade in silk, cotton, and sugar. Pop. (1898) 35,453.

Naftia, näf'tē-ä, **Lago,** or **Lago dei Palici,** Sicily, a historic lakelet of volcanic origin, in an ancient crater over 900 feet in circumference, near Palagonia, in Catania. Its nauseating naphtha-like emanations are fatal to birds and small animals; its waters thick and greenish, and in a frequent state of ebullition from the underpressure of escaping carbonic acid gas. The lake was regarded with superstition by the ancients, and here the Siculi, the earliest known inhabitants, had a temple to two chthonic gods, the Palici of the Romans, which was the seat of the conspiracy and revolt against Rome 104 B.C.

Naga, nä'gä, Philippines, (1) a pueblo of the province of Cebú, situated on the east coast, 12 miles southwest of the town of Cebú. It is a port of call for steamers and coasting craft going to Cebú by the southern passage, and is on the east coast road. Pop. 15,100. (2) The former name of Nueva Cáceres (q.v.).

Nâga, in Hindu mythology, the name given various deified serpents, which are represented as the sons of the Muni Kasyapa and his wife Kadrii. Their king is Sesha, the sacred serpent of Vishnu.

Naga River, a river of southern Luzon, Philippines, rising in the mountains of the province of Albay, within four miles of the Pacific coast and flowing northwest to Bató Lake, on the boundary between Albay and Ambos Camarines. Passing through the lake, it continues its northwest course across Ambos Camarines, and empties into San Miguel Bay. Ten miles from its mouth is Nueva Cáceres, and about midway between this town and the bay the river makes a sweep in the shape of a horseshoe, turning toward the northeast. During its course it has three different names: from its source to Lake Bató it is called the Inaya; from the lake to Nueva Cáceres, Bicol or Vicol; and from Nueva Cáceres to its mouth, Naga. In the second part of its course it receives several important tributaries, is navigable for craft of some size, and forms the channel of trade in rice between Albay and Ambos Camarines. In the latter part of its course it receives the waters of Polanluna, which drains a large valley in the northwest of its province. It is navigable to Nueva Cáceres for vessels of 150 to 200 tons.

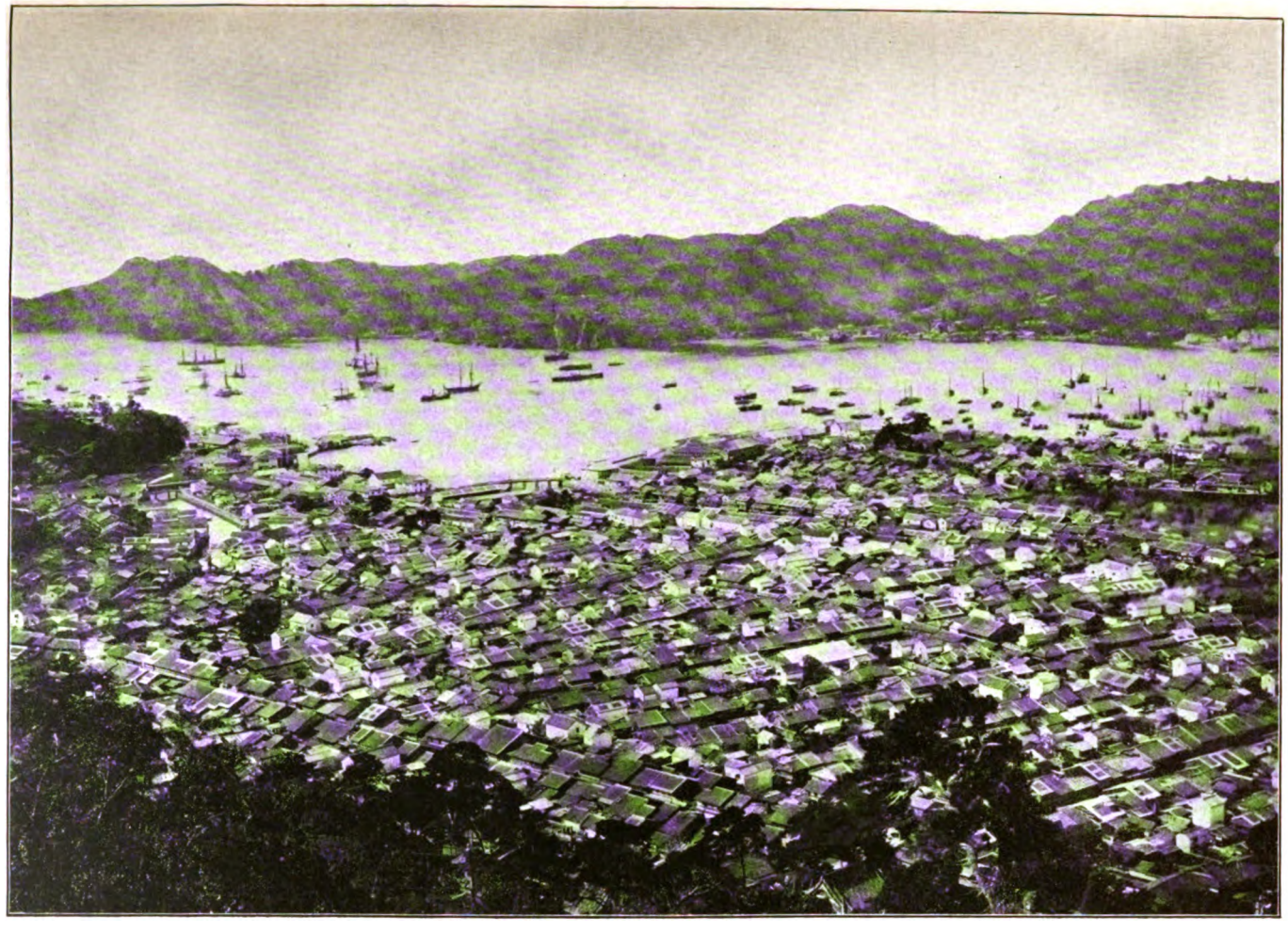
Nagano, nä'gä-nō, Japan, a city of Hondo, 96 miles northwest of Tokyo. It has an active trade in silks, woolens, and other textiles, and is a noted Buddhist pilgrim resort, visited for its celebrated Zenkoji Temple, dating from the 7th century. Pop. (1898) 31,320.

Nagar, näg'ăr or nŭg'ŭr. See BEDNUR.

Nagasaki, nä-gä-sä'kē, Japan, an important treaty port, and the chief town of a prefecture, on the southwest coast of the island of Kiusiu, beautifully situated on a peninsula at the extremity of a bay or harbor, enclosed by hills covered with luxuriant verdure. The streets are wide and clean, while each house has a garden attached. The climate is mild and healthful. An extensive system of modern waterworks has been installed. Previous to 1858 the only European nation allowed to trade here was the Dutch, which has maintained commercial relations with the town for more than 200 years. In that year Nagasaki was one of five Japanese ports opened to the British and Americans, as well as the Dutch; and in October 1869 seven other Japanese ports were opened to most of the European nations, besides the United States. Nagasaki has a splendid harbor, which has been greatly improved by extensive dredging and other operations, and the port at present is the third in Japan. It has a patent slip- and two large graving-docks. In the neighborhood are some of the most productive coal-mines of Japan, and coal is one of the chief articles of export. Other exports are cuttlefish, grain and provisions, rice, flour, shell-fish, paper, cotton (raw and yarn), etc. The imports comprise sugar, rice, raw cotton, oil-cake, kerosene, machinery, metals, coal, locomotives, tobacco, etc. The number of vessels entered in 1899 was 1,096, and the gross tonnage 1,784,770. Ship-building is an important industry and the engine works of Aka-no-ura is its chief industrial establishment. Pop. (1889) 44,921; (1899) 120,865.

Nagcarlán, năg-kăr-län', Philippines, a pueblo of the province of Laguna, Luzon, situated in the centre of the province between the headwaters of the Santa Cruz and the San Diego Rivers, 12 miles south of Santa Cruz. It is on the road between Majayjay and San Pablo. Pop. 13,000.

Nagel, nä'gĕl, **Albrecht Eduard,** German ophthalmologist: b. Dantzic, Germany, 14 June 1833; d. Tübingen, Germany, 24 July 1895. He studied medicine at Königsberg and Berlin and established a practice in Dantzic in 1856. In 1864 he was privat-docent at Tübingen and 1874 he became professor of ophthalmology there. He



VIEW OF HARBOR AND CITY OF NAGASAKI.

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edited the 'Mittheilungen aus der ophthalmiatrischen Klinik in Tübingen' after 1880, and published: 'Das Sehen mit zwei Augen' (1861); 'Die Anomalien der Refraction und Accommodation des Auges' (1880); 'Die Vordbildung zum medicinischen Studium' (1890).

Nä-geli, nä'gĕ-lē, **Karl Wilhelm,** Swiss botanist: b. Kilchberg, near Zürich, 27 March 1817; d. Munich 10 May 1891. He studied in Zürich, Geneva, and Berlin; began (1842) the teaching of botany in Zurich; became extraordinary professor at the university there in 1848, full professor in 1852 at Freiburg, and at Zürich three years later. Afterward he held the professorship of botany at Munich. His most important work for science was in the physiology and morphology of plants. His writings deal chiefly with morphological and cytological subjects, and the transformation of species (see PROGRESSION, or PROGRESSIVE EVOLUTION) is fully treated in his 'Mechanisch-physiologische Theorie der Abstammungslehre' (1883).

Naglee, năg'lē, **Henry Morris,** American soldier: b. Philadelphia 15 Jan. 1815; d. San Francisco 5 March 1886. Entering the Union army early in the Civil War, he participated in the Peninsular campaign of 1862, and in the following year was appointed to the command of the Seventh army corps and of the District of Virginia. He retired from the army in 1864, and later went to California, where he cultivated a vineyard at San José, and gave his name to a well-known brandy.

Nagoya, nä-gō'yä, Japan, the chief town of Owari province, Hondo, near the head of Owari Bay, 92 miles by rail east of Kioto. It was formerly a city of great importance, being for a time the capital of the empire. It is still the fourth city in Japan in respect of population and an important centre for the production of pottery and fancy ware, silk and cotton goods, and other manufactures. The chief edifices are the 17th century castle of Owari with its valuable art collection, and the Higashi Hongwanji Buddhist temple. Pop. (1898) 244,145.

Nagpur, näg- or nŭg-poor', or **Nagpore,** India, a city, district, and division, of the Central Provinces. (1) The city, capital of the district and division, and also of the Central Provinces, 520 miles by rail east of Bombay, although at an elevation of 1,100 feet above sea-level, occupies an unhealthful situation on the banks of the Nag. The municipal limits include, besides the town proper, the native suburb of Sitabaldi, the European station of Sitabaldi, the small suburb of Takli, and a considerable area of land under cultivation. In the centre rises Sitabaldi Hill, crowned with the fort, which is garrisoned by a small detachment from the British regiment at Kamptee, 9 miles distant. There are some Hindu temples and mausolea built in the best style of Mahratta architecture, and several schools. The chief manufactures are cotton and woolen cloths. There is a trade in wheat and other grain, salt, country cloth, European piece and miscellaneous goods, silk, etc., and coal is obtained from a bed at a depth of 200 feet, which is estimated to contain 17,000,000 tons. Here, in 1817, a British force of 1,350 men defeated a Mahratta army of 18,000 men. Nagpur was formerly the seat of a line of rajahs, which became extinct in 1853, when their territory was annexed to the British dominions. Pop. (1901) 124,599. (2) The district of Nagpur has an area of 3,483 square miles; pop. (1901) 751,584; (3) the division of Nagpur, divided into five districts, has an area of 24,127 square miles; pop. (1901) 2,716,748.

Nagrandians, or **Maribois,** a Central American tribe of Indians, formerly occupying Nicaragua, near the present site of Leon.

Naguilian, nä-gē-lē'än, Philippines, a pueblo of the province of Unión, Luzon, situated on the Bauang (or Baoang) River, four miles from the mouth and 10 miles southeast of San Fernando. Pop. 10,400. A small town (pop. 2,200) in the province of Isabela, Luzon, has the same name.

Nagyagite, a telluride of lead and gold agreeing with the formula $PbAu_2TeS$. Besides these elements it often contains traces of copper, silver, sulphur and antimony. It is found native in foliated masses and is hence sometimes called "foliated tellurium." It crystallizes, but rarely, in dimetric forms and its specific gravity is 6.85 to 7.2. It melts easily under the blowpipe and burns with a blue flame. In color it is lead gray, and of a brilliant metallic lustre. It is found in Virginia, but derives its name from Nagyag, Transylvania, where it was first found.

Nahant, nȧ-hănt', Mass., town, in Essex County, on Massachusetts Bay. It is on a peninsula, which extends into the bay about four miles. The surface is uneven, the east coast rugged, in some places bold cliffs are along the shore; the west coast is low and more regular. There are two small villages in the town, one Nahant, the other Little Nahant. The whole peninsula is a residential section; many of the handsome dwellings are the summer homes of Boston men. Nahant is four miles from Lynn, the nearest railroad station, and about 10 miles northeast of Boston. Formerly it was part of Lynn, but in 1853 it was made a separate town. Pop. (1890) 880; (1900) 1,182.

Na'hi Indians. See CREEKS.

Nahr-el-Asi, när'ĕl-ä'sē. See ORONTES.

Nahua (nä'wä) **Indians,** a Central American collective name given to the Indian tribes which were the most powerful in Mexico at the time of the Spanish conquest. They had many pueblos, or towns, knew how to cultivate the ground, were skilled in gold and feather work and used hieroglyphics in writing. About 2,000,000 Indians of that region are now classed as Nahuas. They are sometimes called Aztecs. See AZTEC CONFEDERACY.

Nahuel-Huapi, nä-wäl' wä-pē', or **Tiger Lake,** Argentina, a lake on the boundary between the territories of Neuquen and Rio Negro, on the east slope of the Andes. It is 75 miles long, 10 miles broad, and has an area of 300 square miles, dotted with several islands. It is fed by numerous mountain torrents and is drained by the Limay affluent of the Rio Negro.

Na'hum, one of the 12 minor Hebrew prophets succeeding Zephaniah as the foreteller of Nineveh's destruction. He flourished about 606 B.C. He is said to belong to Elkosh, an unknown place. He announces the fall of Nineveh, as Jehovah's judgment on that sinful city, and his method of releasing his people in captivity there. The prophecy opens with a sub-

lime vision of God's coming to judge the nations. But he will save the righteous, while his enemies the Assyrians are utterly destroyed. The news of the tyrants' downfall will be welcomed by Israel. The capture of Nineveh by its foes (Medes and Chaldæans) is then described. The desolation of the city is a token of Israel's restoration. The fall of Thebes in Egypt (about 668 B.C.) is cited as an example of what is to happen to Assyria, in spite of its fortresses, its wealth and its armies. With a wide view of the working of Providence, an abstention from all moral or homiletic utterances, this powerful prophecy advances with majestic unity from its noble procemium to its close.

Naiada'ceæ, a small family of aquatic plants differing from the *Potamogetonaceæ* (q.v.) in having the flower diclinous, with one stamen and one ovary.

Nail, an elastic horny plate on the upper or dorsal surface of the end of a finger or toe, as in man and monkeys. Hoofs, claws, talons, sheath-horns, and the bills of birds are analogous. Nails and claws of all kinds are modifications of the epidermis, identical in formation and mode of growth. The root of the nail rests in a matrix which is a fold of the dermis, particularly rich in vascular papillæ from which the nail-cells are produced. The pink color of a healthy nail is due to the blood beneath. The little white area toward the root of a nail, called lunula from its crescentic shape, has less blood under it. When nails are destroyed new ones will be formed if the matrix is uninjured. Nails are a support and a defense to the ends of the fingers and toes, assist in picking up small objects, and if healthy and in good condition add comeliness to the parts to which they are attached. To most animals possessing them they are of great importance, giving a needed rigidity to fingers and toes, and adapting them to a great variety of necessary utilities, as firmly seizing and holding prey (perfected in the retractile apparatus of feline claws), scratching, digging, searching crevices for food, and as formidable weapons. In horses, cattle, and other ungulated animals, they enclose some or all the digits, and are called hoofs (q.v.). In the sloths the nails assume a large relative size, and are used as a chief means in arboreal progression. In the Amphibia — as in some toads, efts, etc.— the nails are represented in their simplest form, and appear as mere thickenings of the skin at the extremities of the digits.

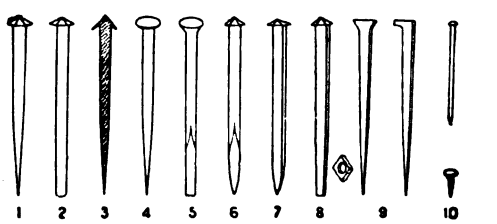
In man the nails appear about the fifth month of fœtal or embryonic life. After birth the nails of the hand grow at the rate of about one millimetre per week, those of the foot about one millimetre per month.

The health of the nails is affected, as is that of the skin, by local or general diseases. They may become thickened (hypertrophy) as the result of inflammation or a degeneration of nerves; diminished in size (atrophy) from traumatic influences; malformed as the result of disturbed function of the matrix; degenerated from faulty nutrition, and discolored in various diseases, the discoloration probably being in the tissues beneath. The nails are also subject to parasitic diseases. A hang-nail is a sliver of skin attached at one end; it should be cut off close to the point of attachment. The painful affection called ingrowing nail usually occurs in the great toe, not through alteration in the nail itself, but from constant pressure of the adjacent soft parts against its edge by a tight shoe. The irritation often results in the formation of an ulcer, extremely sensitive, and subject to continual aggravation from the imbedded nail.

Nails, headed spikes of metal, varying in size from those a little larger than ordinary pins to those several inches in length, and from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch in thickness. Up to the beginning of the 19th century they were made entirely by hand, and constituted a household industry in various countries, married women, and children of both sexes being employed in their production under exceedingly unsatisfactory conditions. In England Birmingham was the centre of the industry, at one time giving employment to over 60,000 persons, and requiring a weekly supply of 200 tons of nail-rods from the iron-works of that district. In the United States New England held a corresponding position, and is even to-day the centre of the industry in America, with Taunton, Mass., as the great tack-making centre of the world. Almost all of the nail output of England was consumed at home, and similar conditions obtained in the United States, France, and Germany.

Hand-made nails were known as wrought or forged nails, and were made from metal plates rolled to the required thickness, and then slit by slitting-rollers into nail-rods or split-rods of various sizes, corresponding to the required size and character of the nails to be forged, and were sold to the nail-makers in bundles. The hand-nailer's outfit consisted of a forge for heating the nail-rods, an anvil (a small cube of steel), a hammer resembling that of a file-cutter (the face being sloped toward the handle), and a few "swages" (stamps or dies for producing ornamental or stamped heads).

To make a nail, a nail-rod was heated on the forge, hammered on the anvil, and a portion of it the length of the required nail was cut off on a chisel attached to the anvil. The head was shaped by the bore, a piece of iron 10 or 12 inches in length, having a steel knob at each end perforated with a hole the size of the



Principal Forms of Nails.

shank of the nail, and countersunk to correspond with the kind of head required. Various forms of heads were produced by employing different kinds of bores. These forged or wrought nails included at least 300 different types, with at least 10 sizes in each type, representing a total of over 3,000 different names, all of which were perfectly understood by those who manufactured or used them. The retail terms — fourpenny, sixpenny, tenpenny, etc.— were not only indefinite in themselves, but

varied in different countries, and even in different localities of the same country. Therefore, they were generally designated by terms defining their use, as deck, scupper, pail, mop, hurdle, etc., or according to the forms of their heads, as clasp, rose, diamond, etc., or the shape of their points, as flat, sharp, spear, etc. Their thickness was expressed as fine, barbed, and strong, and their length in inches, generally in connection with the weight (expressed in pounds) of 1,000 of the nails referred to.. Their principal forms are illustrated by the accompanying drawing, and their uses may be briefly stated as follows: (1) "Rose-sharp" and "fine-rose": the former used for coopering, fencing and other rough work employing hard wood; the latter, with broad spreading heads of greater holding power, used in pine and other soft woods. (2) "Flat-point rose": used in wood liable to split by the wedge-like action of sharp-pointed nails. They were driven with the edges of their flat points across the grain of the wood, and not only prevented splitting, but also held more firmly. (3) "Clasp" nails: commonly used by carpenters in deal and similar woods. The edges of their heads projected downward and, when driven below the surface of the wood, held tightly by clasping a portion of it together, and also allowed a plane to pass over them in finishing work. (4) "Clout" nails, with flat circular heads and round sharp-pointed shanks; used for nailing iron-work and other substances to wood. (5) "Counter-clout" nails, with countersinks under their heads, and chisel points: extensively used by wheelwrights and smiths. (6) "Fine-dog" and "strong-dog," with solid, slightly countersunk heads, round shanks and speared points: used for nailing down stout iron-work, in which the heads are not required to lie flush with the face of the metal. (7) "Kent-hurdle" and "Gate" nails, with broad thin rose heads, flat shanks and good spear-points: used for nailing together and clenching the oaken bars of hurdles, fences, and gates. (8) "Rose-clench" nails, with points cut square: used in nailing wood-sheathing, and the manufacture of packing-cases and boxes, in which the soft wood is liable to split unless bored before being nailed. The square heads of the nails punch out their own holes by driving a portion of the wood before them. The term "clench" was derived from the mode of their employment in boat-building, where they were clenched by hammering down or by riveting the end over a "rove" (a diamond-shaped metal plate), thus drawing the planks together firmly. (9) "Horseshoe" nails, with square or countersunk heads: made of the best refined iron, and capable of being drawn out fine without breaking in the hoof. (10) "Brads and tacks": a class of small very useful nails, employed for a variety of purposes too numerous to mention. The latter were sometimes made so small that 1,000 did not exceed 20 grains in weight.

The credit of inventing nail-making machinery appears to belong to the United States, which in 1786 granted a patent to Ezekiel Reed, of Bridgewater, Mass., for a "cut-nail" machine. About the beginning of the 19th century nail-making machines had been generally introduced in England, but the first English patent was granted to John Clifford in 1790. In making cut nails strips of metal of a breadth and thickness corresponding to the size and thickness of the required nail, and about a foot in length, are heated to a black heat and fed into the machine end first. A slicer cuts off the nail-blank, which in falling is clutched at the neck and held until a moving die strikes its upper end and forms the head; it is then liberated and passes out into the trough. In small nails the taper of the shanks and points is obtained by cutting the nail-blanks alternately, the metal strip (of uniform thickness) being turned over after each cut so that the points and heads are taken from the opposite sides of the blank; while in the larger nails the metal strip is rolled so that its cross section corresponds to the required taper. These machines turn out nails at a rate of 10 to 1,000 per minute, according to the size of the nails. Cast nails are produced by the ordinary process of molding in sand. They are relatively brittle, but are cheap, and are used for rough purposes, such as lathing and in the manufacture of stout boots and shoes. Wire nails were first made in France, hence sometimes called "French nails." They were used in the woodworking trades, and up to 1850 were made by hand. The wire was cut into the required lengths; a wire-blank was pinched in a vise, with a small portion projecting, which was flattened into a head by a few blows of the hammer. Subsequently machines were invented into which the wire was fed, and the cutting, heading, and pointing were performed automatically.

In the United States William Hersel, of New York, produced the first hand-made wire nails in 1850. Shortly afterward French machines were imported, but they were soon superseded by those of American make, which were awarded medals over those of French and German manufacturers at the Centennial Exhibition in 1876. The new industry, however, was of slow growth. Up to 1885 there were about 25 firms engaged in it, but since then these nails have been widely adopted in the manufacturing trades. They are now (1904) being produced by more than 80 plants in various parts of the United States, and are rapidly supplanting all the other forms of nails. With the exception of horseshoe nails, which to a large extent continue to be made by hand, from fine grades of wrought iron, all nails are now made of mild steel by machines. In the United States the production is in excess of the consumption, and American wire nails, especially, have been exported to European and other countries in increasing quantities for several years. The money value of the export of 1891 was but $420,697, while that of 1900 reached a total of $3,050,408. Consult: Smith, 'Treatise on Wire'; Swank, 'History and Manufacture of Iron in all Ages'; Reports of the Bureau of Statistics, United States Treasury Department.

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Nain Sing, Hindu explorer: b. Numaon; d. Morabad 1 Feb. 1882. He received from a military officer, Col. Montgomerie, instruction and stimulus for the work of exploration, which he afterward carried on in Central Asia, first in Cashmere and Ladak (1856–7), and later in Tibet, making a journey (1865–6) to Lhasa (q.v.),

which won him recognition from the Royal Geographical Society. This was followed by other important journeys, chief of which was that across the Tibetan plateau (1874–5), of which he was the first explorer. The 'Geographical Magazine' (1876) published an account of this journey, with a map.

Naini Tal, India, a town and district of the United Provinces: (1) the town, capital of the district, has a beautiful situation besides a lake, 6,409 feet above sea-level, between spurs of the Himalayas, 70 miles north of Bareilly. It is a popular health resort, the summer headquarters of the provincial government, and has a military convalescent hospital. A disastrous landslip here in 1880 destroyed 150 lives. Pop. (1901) 12,408. (2) The district has an area of 2,658 square miles; pop. (1901) 306,362.

Naipali (nī-pā'lē) **Language,** an Indian language spoken in Nepal. It resembles the Hindu. The literature of the language is very scanty.

Nairne, nārn, **Carolina Oliphant,** BARONESS, Scottish poet: b. Gask, Perthshire, 16 Aug. 1766; d. there 26 Oct. 1845. Her father was a staunch Jacobite, and named her after the young Pretender. In 1806 she was married to her cousin, William Murray Nairne, who in 1824 became Baron Nairne. Her poems were issued in 1846 as 'Lays from Strathearn,' and in 1869 Charles Rogers edited a volume entitled 'The Life and Songs of the Baroness Nairne,' of which a revised edition appeared in 1886. Among her poems are several of the most popular Scottish songs, such as 'The Land o' the Leal'; 'The Laird o' Cockpen'; 'Caller Herrin'; 'The Auld House'; 'Charles is my Darling.'

Nairs, nā'ērz, a Mohammedan caste in Malabar, who have peculiar marriage customs, polygamy and polyandry thriving side by side.

Naissant. See HERALDRY.

Nakshatra (Sanskrit, "celestial luminary" or "star"), in the Vedas simply means a star, but later was used of what in the mythological astronomy of India are called mansions of the moon, in which that planet periodically rests in its course through the heavens; these were small clusters of stars or asterisms, 27 or 28 in number. They were mythologically personified as the daughters of Daksha, and wives of the moon. Their introduction into the Hindu system has been variously accounted for. Consult: Thibaut on Hindu astronomy and astrology in Bühler, 'Grundriss der Indo-Arischen Philologie' (1899).

Nala, nā'la, in Hindu mythology, a legendary king of ancient India, whose love for Damayanti, the daughter of Bhima, king of Vidarbha, and the adventures arising therefrom, forms a celebrated episode of the 'Mahâbhârata,' as also of a separate poem, the 'Nalodaya,' attributed to Kalidasa.

Naltunne Tunne (näl-tŭ-nā' tŭ-nā') **Indians,** an American tribe of the Athapascan family, formerly residing on the Pacific coast south of Rogue River, Oregon. A few descendants of the race now live on the Siletz reservation, Oregon.

Namaland. See NAMAQUALAND.

Namangan, nä-män-gän', Russian Turkestan, a town of Ferghana, on the Sir-Daria, near the confluence of the Narin, about 50 miles northeast of Khokand. It is in a rich oasis, and is the trading centre for the surrounding nomadic tribes. Near it naphtha and coal are found. Pop. (1897) 62,000.

Namaqualand, nä-mä'kwä-land, or **Namaland, Great** and **Little,** southwest Africa, territorial divisions occupying an extensive region bordering on the west coast, and separated by the Orange River; Great Namaqualand belonging to Germany, being north of the river, and Little Namaqualand, belonging to Great Britain, on the south. (1) GREAT NAMAQUALAND extending along the west coast from the Orange River, lat. 28° 30' S., to Walfish Bay, lat. 23° S., and stretching inland from the west coast to the Kalahari Desert, has an estimated area of 100,000 square miles. It is mainly drained by the Oup, Borradaile, or Great Fish River, which, after a southerly course of about 450 miles, joins the Orange River. Along a coast-line of over 400 miles there is scarcely a running stream to be met with. There are several small bays in which safe anchorage may be had, such as Angra-Pequena, Sandwich Harbour, and Walfish Bay (q.v.) the latter with a small dependent territory belonging to Great Britain. The country is favorable for the rearing of cattle, which is the chief occupation. Copper ore appears to be in abundance in several localities, and in the vicinity of Kalahari Desert ivory and ostrich feathers are collected. The lion, giraffe, rhinoceros, and hippopotamus are still found in the north, although rapidly disappearing. The gemsbok, eland, and other large antelopes, now driven from Cape Colony, still find a refuge in the less frequented districts. The region is for the most part inhabited by the Namaquas, the principal existing tribe of the race generally known as Hottentots. The total number of Namaquas in Great and Little Namaqualand does not exceed 50,000; they lead a half-pastoral, half-predatory life, yielding allegiance to a number of petty chiefs. Polygamy is universal among them. They are gradually disappearing before the Griquas and other mixed races. The region has belonged to Germany since 1885, but little has been done toward its development. (See GERMAN SOUTHWEST AFRICA.) (2) LITTLE NAMAQUALAND, an electoral division of Cape Colony south of the Orange River, is a dry and barren region, but derives some importance from its copper mines. The chief mining station is Ookiep, 90 miles from Port Nolluth, with which it is connected by rail. Pop. 16,809, chiefly Namaquas and Griquas, and in the neighborhood of the mines, numerous Dutch farmers and English settlers.

Namas. See HOTTENTOTS.

Namaycush, the great lake-trout (q.v.).

Namby Pamby, a name bestowed upon Ambrose Philips (q.v.) (1671–1749).

Names of persons in the very earliest ages no doubt had some significance and meaning, but no record is handed down to us. The Old Testament names are almost all original, that is, given in the first instance to the individual bearing them, and either originated in some circumstance of birth or as an expression of some religious sentiment, thus — Jacob (supplanter), Isaac (laughter), Isaiah (salvation of Jehovah), etc. The names of women had equal signifi-

cance: Rachel (ewe), Hannah (favor), Deborah (bee), etc. In Old Testament times the name was often changed on the occasion of an important event in one's life, Abram becoming Abraham, Jacob becoming Israel, and so on. Neither the Hebrews, Egyptians, Assyrians, Babylonians, Persians, nor Greeks had surnames; and in the earliest period of their history the same may be said of the Romans. In course of time, however, every Roman citizen had three, the prænomen or personal name, which was placed first, and commonly written with one or two letters, for example C. for Gaius, Cn. for Gneius, M. for Marcus, Q. for Quintus, and so on. Then followed the nomen, the name of the gens or clan, as Cornelius, Julius, Fabius, from the Cornelian, Julian, and Fabian gentes. Lastly came the cognomen or family name, as Cicero, Cæsar, Scipio, etc. Conquerors were occasionally complimented by the addition of a fourth name or agnomen, commemorative of their conquests, as Coriolanus, Africanus, Germanicus, etc. While the earliest Greek names were expressive of some quality in high estimation, as Callimachus (excellent fighter), Apollodorus (gift of Apollo), the Roman names were less dignified and ambitious in their origin; thus Porcius (swineherd), Cicero (vetch grower); some from personal peculiarities, as Naso (long-nosed), Paulus (little), Crassus (fat), Cocles (one-eyed). Celtic and Teutonic names had often equal significance, as Gottfried (God's peace), Conrad (bold in counsel), Bertha (brightness), Ethel (noble), etc. Times of great public excitement have had a very considerable influence in modifying the fashion in names. Thus the English Puritans preferred Old Testament names and such as directly expressed religious sentiment. Among the Scottish Covenanters Old Testament names were also prevalent. At the French Revolution the names of the most famous Greek and Roman republican heroes were in general favor.

The principle of the modern system of personal nomenclature now adopted in most countries in Europe is to have one name for the individual (Christian or baptismal name) joined to a second name which is common to the family to which he belongs (surname). It is impossible to state with any degree of certainty when this system became general. No instance is known, we believe, of any Anglo-Saxon family bearing a surname from generation to generation. They were introduced by the Norman adventurers, but were for centuries confined to the upper classes. Surnames became general in Scotland about the 12th century. In some of the wilder districts of Wales they can hardly be said to have been adopted even yet. The principal sources from which surnames are derived are personal characteristics, rank, or profession, localities, animals, or natural objects, and patronymics. Thus from the first source, personal characteristics, we have Black, Brown, Grey, Green, Whyte; Little, Long, Short, Broadhead, Lightfoot, Cruickshank. From rank or profession we have King, Prince, Pope, Bishop, Abbot, Prior, Stewart or Stuart, Smith, Wright, Carpenter, Taylor, Baker or Baxter, Weaver or Webster, Falconer, Fletcher (arrow-maker), Glover, Bowman, Chapman or Marchant, Miller, Brewer or Brewster, Shepherd. From localities, animals, or natural objects, come Hill, Dale, Wood, Forest, Brookes or Burns, Grove, Shaw; Bird, Lyon, Hogg, Crabbe, Fox, Roebuck, Bull; Stone, Tree, Flint, Steele. From patronymics are derived Andrews, Anderson; Alexander, Sanderson, Sandison; James, Jameson, Jamieson; Jones, Johnson, Jonson, Jackson; Williams, Williamson, Wills, Wilson; Thom, Thomson; Roberts, Robertson, Robinson. Surnames in many other languages are derived from like sources; thus Black, Whyte, Brown, are with the Germans Schwartz, Weiss, Braun; with the French, Lenoir, Leblanc, Lebrun; the Gaelic prefix Mac, the Irish O', the Norman-French Fitz, the German affix -sohn or -son, the Scandinavian -sen, the Russian -vitch, are all equivalents of the English affix -son. The Hebrews, as already stated, had no surnames proper, nor had the Arabians; but to distinguish two men of the same name the former used the form Solomon ben David (Solomon son of David), and the latter Abraham ibn Esra (Abraham son of Esra). The Welsh used the word ap in the same way; Evan ap Richard (John son of Richard). In most nations the wife changes her surname on marriage to that of her husband; in Spain, however, she retains it, while the son may adopt either the paternal or maternal name. In Great Britain a man may now change his Christian name and surname without an act of Parliament, royal license, or even public advertisement; but there is no law to compel third parties to use the new name. In the United States names can only be changed by special act of State legislatures.

Nicknames of persons are most difficult to classify owing to the great variety of origins. Physical peculiarities, complimentary (as Strongitharm), derogatory, as Spindleshanks, Sheepshanks, Crookshanks, Heavisides, etc.; mental attributes, as Grave, Stern, Wise, Sage, Moody, Proud, Courteous (Curteis), on one hand, and on the other Blythe, Gay, Foolhardy, Jolly, Meek, etc.; nicknames from complexion and color of the hair, as Black, White, Brown and Browning, Ruddy, Readman, Hoare, Grey, etc.; nicknames from peculiarities of dress, Curtmantel, Shorthose, etc.; from social position, as Bastard, Lacklands, and so on; from the animal and vegetable kingdoms, from birds and fishes. Then compounds were made by applying a sobriquet to a Christian name, as Micklejohn, Littlejohn, Brownjohn; if he was a comely, well made fellow, he was Properjohn. These names appear again in Norman guise, as Grosjean, Petijean, Bonjean, from which comes Bunyan — so that when we speak of good John Bunyan we are (perhaps unconsciously) only translating the name of "the inspired tinker." See NATIONAL NICKNAMES.

Bibliography.— Barber, 'British Family Names' (1894); Bardsley, 'Dictionary of English and Welsh Surnames' (1901); Innes, 'Concerning Some Scotch Surnames' (1860); Yonge, 'History of Christian Names' (1863).

Namouna, nä-moo-nä', in Persian mythology, an ever young and beautiful enchantress, born long before any other created thing, yet still retaining all her youthful attractiveness.

Namur, nä'moor (Fr. nä-mür'), Belgium; (1) a city, capital of the province of the same name, at the confluence of the Sambre and Meuse, 35 miles southeast of Brussels. The

old fortifications have been razed since 1866 with the exception of the picturesque citadel dating from 1784, built upon steep rocks, high above the confluence of the rivers. A cordon of five large and four small modern forts now defend the town. The town is beautifully situated and well built, with spacious streets and several handsome squares. Frequent sieges and bombardments destroyed almost all its ancient buildings. Among those of more recent times are the cathedral dedicated to St. Aubin, one of the most handsome modern churches of Belgium; the church of St. Loup, the church of Notre Dame, the Hôtel de Ville, and the belfry tower. Namur is the seat of a bishop; it possesses a chamber of commerce, a royal athenæum, a public library, a museum, an agricultural society, normal and various other schools, and numerous benevolent institutions. Namur is famous for its cutlery, its leather-works, and its iron and brass foundries. The trade is greatly favored by the two navigable rivers. Steamers ply on the Meuse; and railways communicate with Brussels, Mons, and the French frontier. Namur dates from the 7th century, under the names of Namucum, Navinucum Castrum, and Namon. It was taken by Louis XIV. in 1692, and retaken by William III. of England in 1695. Pop. (1900) 32,333. (2) The province is bounded on the north by Brabant, northeast by Liège, east by Luxemburg, south and southwest by France, and west by Hainaut; greatest length, north to south 57 miles; greatest breadth, 37 miles; area, 1,413 square miles. The surface is greatly diversified, well watered by the Meuse, with its tributaries, the Lesse and the Sambre. About one half of the whole surface is cultivated. The chief vegetable productions are the ordinary cereals, oil-seeds, chicory, fruit, and medicinal and dye plants. In some places the vine is cultivated. The extensive forests furnish good timber and the prevailing carboniferous strata yield coal, iron, limestone, etc. The industry of the province, both manufacturing and commercial, is largely developed. Namur was an independent county as early as the 10th century. At the close of the 12th century it came into the possession of the counts of Hainaut, and early in the 13th century fell to Peter of Courtenay, emperor of Constantinople. It was sold by his son Baldwin to Guy of Dampierre, count of Flanders, with whose descendants it remained till 1420, when it was purchased by Philip the Good, Duke of Burgundy, for 132,000 gold ducats, and afterward shared the fate of the other Burgundian states. Pop. (1900) 346,512, nearly all of whom speak Walloon.

Nan-Chang-Fu, China, the chief town of the province of Kiang-si, 176 miles southeast of Hankow, on the Kan-Kiang, near its entrance into the Po-yang. It is noted for its porcelain industries. Pop. (est.) 150,000.

Nan-Che, China, a town in the province of Chekiang, 40 miles west of Yen-chow-fu, in a beautiful valley at the confluence of the Hwuy-chow with one of its affluents. It is neat and clean, about three miles in circuit, and carries on a considerable river trade with the towns above and below. Pop. (est.) 200,000.

Nan-Ning, China, a trading station and treaty port in the province of Kwang-tung, 300 miles southwest of Canton, at the limit of navigation on the Yu-Kiang. Pop. (est.) 40,000.

Nana, a novel by Emile Zola, one of the Rougon-Macquart series, which appeared in 1880. It is a study in heredity, the evil effects of which upon an individual and reflexively upon society are powerfully portrayed in the development of the leading character, Nana, a dissolute actress.

Nana Sahib, nä'nä sä'hīb, Mahratta leader of the Sepoy rebellion: b. near Cawnpore 1825; d. Nepal about 1859. His real name was Dhandu Panth, and he was the adopted son of the last Mahratta peshwa of Poona, whose great wealth he inherited, but whose annual pension of about $400,000 was not continued to him by the British government. He lived as a native prince, moving in European society, and when the Sepoy mutiny broke out he secretly encouraged it, but openly offered aid to the English. He marched on Delhi at the head of native troops; promised the English a safe conduct from Cawnpore, but shot or drowned all of them but four; and before leaving the city killed all Europeans, women and children included, that he found in the city, and threw their bodies into the famous well of Cawnpore. He fled to Nepal, was repeatedly defeated by the English, and was not heard of after 1859.

Nanaimo, na-nī'mō, Canada, a seaport town of British Columbia, on Departure Bay, on the east coast of Vancouver Island, opposite Vancouver town on the mainland, with which it has a daily steamer service. It derives its importance from the valuable coal-mines in the neighborhood, and large quantities are exported from its excellent harbor, and also by the Esquimalt and Nanaimo railroad, which connects with Victoria, 59 miles to the south. Nanaimo originated in a Hudson's Bay Company trading post established in 1833; it was incorporated in 1874 and is a thriving municipality. Pop. (1901) 6,130.

Nânak, nä'nāk, **Nânek,** or **Nânuk,** Hindu religious leader, founder of the sect of the Sikhs: b. Talwandy (now Nankana), in Lahore, 1469; d. Kirtipur 1538. A member of the warrior caste, he early associated with Kabir, leader of a monotheistic sect, and came under other mystical influences. He traveled to all the holy places of India, made the pilgrimage to Mecca and Medina, and as a result of his studies of Brahmanism and Islam wrote the 'Adi-Granth,' which frequently quotes Kabir, and in general is a mixture of the Vedas and the Koran. This gospel he preached through India; it became the national religion of the Sikhs and was proclaimed by Nânak's successors from Labona down to Govind Sinh, who died in 1708. The 'Adi-Granth' preaches the worship of one god, the equality of man, the duty of loving all men, and the need for frequent ablution. See SIKHS.

Nan'crede, Charles Beylard, American surgeon: b. Philadelphia 30 Dec. 1847. He was graduated at the medical school of the University of Pennsylvania in 1869; practised in Philadelphia for 20 years; in 1889 became physician, professor of surgery, and surgeon in the University Hospital, University of Michigan; served with distinguished bravery in the Santiago campaign in 1898; contributed to the 'International Cyclopædia of Surgery,' to the 'Cyclopædia of

Diseases of the Nose and Throat,' to Parkes, 'Treatise on Surgery,' etc.; and wrote 'Principles of Surgery' (1899).

Nancy (Fr. nŏn-sē), France, the capital of ancient Lorraine, of the former department of Meurthe, and since 1872 of the department of Meurthe-et-Moselle, situated in a fertile plain, near the left bank of the Meurthe, 218 miles east of Paris, on the railway to Strasburg. It is divided into the old and the new town, and has extensive suburbs. The former is for the most part irregularly built, with streets narrow and winding; but has several fine public buildings. The new town has straight and spacious streets, intersecting each other at right angles, and traversed by tramways; the houses, almost without exception, are handsome. The Place Stanislas, surrounded by several fine public buildings, and communicating, by a triumphal arch, with the Place Carrière, has a fine statue of Stanislas Lesczynski, king of Poland, who passed the latter years of his life here as Duke of Lorraine, and bestowed upon the town many of its finest modern embellishments. There are statues also to Gen. Drouot, Thiers, and other notabilities. The Cours Léopold, occupying the highest part of the town, and finely planted, is the principal promenade; another is the Pépinière, a large planted area. Among the chief edifices are the cathedral, a modern structure in the Italian style; the church of St. Epvre, with a lofty tower and a fine portal, one of the finest specimens of modern Gothic in France; the church of the Cordeliers, built in 1484, and containing the tombs of several dukes of Lorraine; the 19th-century churches of St. Peter, St. Vincent, and St. Leon; Hôtel de Ville (17th century); ducal palace, an elegant specimen of flamboyant Gothic, with a fine porch (16th century); public library (88,000 volumes and 1,200 manuscripts); seven handsome gates or triumphal arches. Nancy is the see of a bishop, and the headquarters of the 20th army corps. At the head of its educational institutions is the celebrated university founded at Pont-à-Mousson in 1572 and removed to Nancy in 1768; it has faculties of law, philosophy, natural science, mathematics, medicine, and a school of pharmacy; Nancy also has a lyceum, a botanical garden, a school of forestry, a theological seminary, etc. The manufactures consist of broadcloth and other woolen stuffs; cottons and cotton yarn, hosiery, lace, all kinds of embroidery, stained paper, tobacco, etc. There are also ironworks, dye-works, breweries, and tanneries. The most memorable event in the annals of Nancy is the battle fought under its walls, when the Duke of Burgundy (Charles the Bold) was signally defeated and slain by René II., Duke of Lorraine. On 12 Aug. 1870 it surrendered to the Germans, by whom it was occupied until 1 Aug. 1873. The population was largely increased by the influx of Alsatians after the annexation of Alsace to Germany. Pop. (1872) 52,978; (1901) 102,463.

Nanda Devi, India, a peak of the main Himalayan Range, near the sources of the Ganges and the Brahmaputra, with a height of 25,656 feet.

Nandi, in Indian mythology, the goddess of joy and mirth.

Nan'du, a Brazilian name for the South American ostrich or rhea. See RHEA.

Nanek, or **Nanuk.** See NANAK.

Nanini, Giovanni Maria, jō-vän'nē mä-rē'ä nä-nē'nē, Italian composer: b. Vallerano, Italy, about 1540; d. Rome, Italy, 11 March 1607. He studied music in Rome and was appointed Maestro di Cappella there in 1571. In 1577 he became a member of the Pontifical Choir. His compositions are of great value, among them are: 'Hodie nobis Cœlorum Rex'; 'Cento cinquanta sette Contrappunti e Canoni'; etc.

Nankeen, or **Nanking Cloth,** a sort of cotton cloth, which takes its name from the city of Nanking, where it was originally manufactured. It was formerly imported extensively from China, but has generally been superseded by other fabrics. It is now imitated in most other countries where cotton goods are woven. The English manufactures have now so completely driven the Chinese from the market that large quantities are shipped from that country to Canton.

Nanking, nän-kĭng' (officially *Kiangning,* that is, Southern Capital), China, capital of the province of Kiang-su, and vice-regal headquarters for the three provinces of Kiang-su, Kiang-si, and Ngan-hwei, near the right bank of the Yang-tse-Kiang, 560 miles south by east of Peking. It is 18 miles in circumference, and is surrounded by a wall 40 feet high. The principal streets are of moderate width, clean, well paved, and lined with handsome stores; but the houses are, in general, mean, and only one story high. The part of the city occupied by the Manchus is separated by a wall from the Chinese town. There are extensive manufactures of fine satin and crape, and the cotton cloth which foreigners call nankeen derives its name from this city; paper and ink of fine quality, and beautiful artificial flowers of pith paper, are produced here. Nanking is celebrated also for its scholars and literary atmosphere, having many large libraries and book stores.

Nanking was the capital of the Chinese empire from 1368 to 1403; but when the seat of government was transferred to Peking it lost its importance and a great part of its population, about a third of its area being now unoccupied. The only remarkable remains of royalty are the sepulchral Ming statues situated near the walls. The famous porcelain tower of 9 stories, and 200 feet in height, completed in 1432, was destroyed during the Taiping rebellion. The city was held from the spring of 1853 to July 1864 by the Taipings, who made it their capital. At its capture by the rebels and recapture by the Imperialists it suffered severely. By the French treaty of 1858 Nanking was made a treaty port, but never attained any importance as such, owing to the vicinity of Chinkiang-fu. Pop. estimated at 140,000.

Nanna, nän'nä, in Scandinavian mythology, the wife of Balder. When the blind god slew her husband, she threw herself on his funeral pile and was burned to death. See MYTHOLOGY.

Nan'nacus, or **Nannakos,** according to a Greek legend, the king who predicted Deucalion's flood.

Nansen, Fridtjof, frēt'yŏf nän'sĕn, Norwegian Arctic explorer: b. Great Fröen, near Christiania, 10 Oct. 1861. He studied at Christiania University, and in 1882 made an Arctic voyage in a sealing vessel in order to have opportunities of studying animal life in the higher latitudes. On his return he was appointed curator of the Bergen Natural History Museum. In 1888 he crossed Greenland from sea to sea a little north of latitude 64°, an account of this journey being published in England in 1890, under the title 'Across Greenland.' He returned in 1889, and was appointed curator of the Museum of Comparative Anatomy in Christiania University. In 1893 he sailed on board a specially built steamer (the Fram) in the expectation that, entering the Polar ice in the neighborhood of the New Siberian Islands, he would be drifted by a current over the Pole and would come out on the east side of Greenland. This expectation was based on the fact that articles belonging to the Jeannette, an Arctic expedition vessel lost in 1881, had drifted in about three years from Bering Strait across the Polar regions to Greenland. After being carried to lat. 83° 59′, he left the Fram and crew, and with a single companion, Lieutenant Johansen, and with sledges, dogs, and kayaks, took the ice. In this way he reached a higher latitude than any previously attained, 86° 14′ (8 April 1895), and then turned southwestward to Franz Josef Land. There he spent the winter of 1895–6 and on 17 June 1896 fell in with members of the Jackson-Harmsworth expedition, with which he returned to Vardē. The Fram, under Captain Sverdrup, had reached lat. 85° 57′, and had been for four months fast in the ice. Nansen was received everywhere with the greatest enthusiasm, and medals and other honors were conferred upon him, including a professorship of zoology in Christiania University. In 1897 he published an account of his voyage, which appeared in English as 'Farthest North,' certainly the most interesting of all narratives of Arctic travel. A translation of a work by him on 'Eskimo Life' was published in 1893.

Nantel, nän-tĕl′, **Guillaume,** Canadian journalist and politician: b. St. Jerome, P. Q., 4 Nov. 1862. He received his education at the seminary of Saint Thérèse de Bainville and was admitted to the bar in 1875. He was editor of the St. Jerome 'La Minerve' and of 'Le Nord,' and in 1882 was elected to the Canadian Parliament and was re-elected in 1886, '90, '92. From 1887–92 he edited 'La Presse' at Montreal, and in 1897 founded 'La Monde Canadien.' He was minister of public works in 1891–6 and is a director in large railroad concerns. He published: 'Notre Nord-ouest provincial' (1888).

Nantes, nänts (Fr. nänt), France, capital of the department of Loire-Inférieure, and an important commercial port, on the right bank of the Loire, where it receives both the Erdre and the Sèvre, 248 miles by rail west-southwest of Paris. The Loire here forms a number of islands, two of which are among the finest quarters of the town, and are connected by several bridges. The situation, on an important navigable river, within 40 miles of the ocean, is advantageous for commerce, and has been enhanced since 1891 by the construction of a ship-canal to Saint Nazaire at the mouth of the Loire. Nantes is so well placed, and so regularly, and in some parts so splendidly built, that it justly ranks as one of the finest towns in France. It has a number of elegant squares; and its quays, which line the banks of the rivers, extend nearly five miles. The notable public edifices are the cathedral, in the flamboyant style, dating from the 15th century; the handsome modern church of St. Nicholas in the Gothic style of the 13th century, with a tower 278 feet high; the celebrated ducal castle, an edifice of the 14th century, partly modernized in the 16th, flanked with massive round towers; the palace of justice or law-courts, a large and handsome building; the Hôtel de Ville; the exchange, restored and enlarged in 1891; the museum of natural history; and the new museum (1897); the large picture-gallery; public library of 102,000 volumes; chapter-house, and Hôtel Dieu or infirmary. Nantes is the see of a bishop; it has courts of first resort and commerce, a chamber of commerce and exchange, a college, diocesan seminary, and secondary ecclesiastical school; a secondary school of medicine, and a hydrographical school of the first class. The manufactures consist of blankets, serge, flannel, printed stuffs, canvas, ships' boilers and machinery, cordage, chemical products, glue, ship biscuits, etc.; there are also cotton-mills, sugar-refineries, iron-works, glass-works, bleach-fields. Sardines and preserved meats are important articles among its industrial products. The building-docks are of great extent. Nantes carries on a large foreign trade, vessels of 1,700 tons now being able to reach the town. The trade includes a variety of articles both for the home, the colonial, and the foreign markets. Before the conquest of Gaul by the Romans, Nantes was the capital of the Nannetes. In 445 it valiantly withstood a siege of 60 days by the Huns. During the 9th century it was thrice taken by the Normans, and almost entirely ruined. In 1118, when it had again become prosperous, an accidental fire reduced the greater part of it to ashes. During the English wars in France it suffered much, repeatedly falling into the hands of opposite parties. For a long time it formed one of the most valuable possessions of the dukes of Brittany, but in 1499 the heiress of the dukedom, Anne of Brittany, who was born here, having married Louis XII., it passed with the rest of her possessions to the crown of France. The most memorable event connected with the history of Nantes is the famous edict (see EDICT OF NANTES) issued here by Henry IV., 30 April 1598, securing the Protestants in the free exercise of their religion, and making them eligible to all civil and military employments. This edict was revoked by Louis XIV. in 1685. The *noyades* or drownings of the monster Carrier during the Revolution were perpetrated here. (See CARRIER.) Pop. (1901) 128,349.

Nantes, Edict of. See EDICT OF NANTES.

Nanteuil, Robert, French copperplate engraver: b. Rheims 1630; d. Paris 1678. His father-in-law, Nicolas Regnesson, was his first instructor and in 1647 he went to Paris and worked under the eye of Philippe de Champagne (q.v.). Louis XIV. appointed him designer and engraver to the king. He employed in his work a simple line which grew gradually

thicker at the shade point and died away toward the high light in faint and fainter stipple points, in this way he produced the fine color values which characterize his engravings. In his portraits, of which about 200 exist, he exhibits powerful modeling and life-like drawing. Some of these latter works are after the paintings of Lebrun, Du Chastel, and others. He also executed some excellent pastels. Consult Loriquet, 'Robert Nanteuil' (1886).

Nanticoke, năn'tĭ-kōk, Pa., borough, in Luzerne County; on the Susquehanna River, and on the Delaware, L. & W., the Central of N. J., and the Pennsylvania R.R.'s; about 80 miles north by east of Harrisburg. It was settled about the middle of the 19th century, and incorporated as a borough in 1874.

It is situated in an anthracite coal region, and has extensive water power which is utilized in manufacturing. The industry contributing most to the wealth of the town is coal mining. The chief manufacturing establishments of the city are mining and agricultural implement works, large hosiery mills, knitting factories, canning factory, flour and grist mills, lumber mills, and cigar factories. It has considerable trade in coal, and its own manufactures. The government is administered under the original charter which provides for a burgess, who holds office three years, and a council. Pop. (1890) 10,044; (1900) 12,116.

Nanticoke Indians, a former American tribe of the Algonquin family residing in Maryland. They were of very dark complexion and were notorious for their peculiar customs and ceremonies. The Iroquois made war upon them in 1678, and in 1722 only about 500 of them survived. Later they removed to southern New York, and afterward to Ohio, where they joined the Delawares.

Nantuck'et, Mass., town, county-seat of Nantucket County; embracing the islands of Nantucket, Tuckermuck, and Muskeget. It is about 25 miles from the mainland of the State and 100 miles southeast of Boston. On the north is Nantucket Sound, on the east and south the Atlantic Ocean, and on the west Muskeget Channel, which separates it from Martha's Vineyard. The main island, Nantucket, is about 15 miles long, and averages about two miles in width. The area of the whole town is about 60 square miles. The most populous part of the town is along the north shore of the largest island. There are several villages in the town, the largest, Nantucket, on Nantucket harbor, was founded in 1673. The first settlement was made in 1659, by a colony in charge of Thomas Macy, at the place called Madeget. Nantucket is a famous summer resort; the island is dotted with handsome summer villas. The residents claim that the climate is antagonistic to asthma, hay fever, and malaria.

At one time Nantucket was the headquarters of a great whaling industry, but the chief industries of the present (1904) are agriculture and fishing. A flourishing coastwise trade is carried on by a number of the islanders. Muskeget Park is one of the attractions. The town has a public library (the Athenæum), and the Coffin high school. At the "town meeting" the administrative officials are annually elected. Pop. (1890) 3,268; (1900) 3,006. Consult Hinchman, 'Early Settlers of Nantucket.'

Naoroji, now'rō-jē, **Dadabhai,** first Indian member of the English Parliament: b. Bombay 4 Sept. 1825. He is the son of a Parsi priest, and was educated in the Bombay school that developed into the Elphinstone School and College, where he was the first native professor of mathematics and natural philosophy (1854). In 1855 he went to England, where he has since, for the most part, resided. In 1867 he assisted in founding the East India Association; through his efforts in 1870 the civil service was opened to native Indians; and he accomplished much for the improvement of Indian finance and industries. He became prime minister to the Prince of Baroda in 1874; from 1875 to 1887 held important municipal and legislative positions; and in 1886 and 1893 was president of the Indian National Congress. For many years he was president of the London Indian Society. From 1892 to 1895, as a Liberal, he represented Central Finsbury in the House of Commons, and in the latter year was made a member of the royal commission formed to inquire into Indian expenditure, etc. He has written: 'England's Duties to India' (1867); 'The Wants and Means of India' (1870); articles collected in 1887; and 'Poverty and Un-British Rule in India' (1901).

Nap, or **Napoleon,** a card game played by two or more players, each of whom receives five cards. It is usually played for money, a fixed stake per trick being agreed on. When the player at the left of the dealer examines his cards he either declares to win one, two, three, four, or five tricks — the latter called "going nap"; or he "passes," that is, declines to play, being accordingly out of that game. If he declares any number of tricks less than five, the next player in order has an opportunity of declaring or passing, the one who declares the highest number of tricks being always the one who has to play. The first card played determines that trumps are to be of that suit for the game. Should the player declaring succeed in winning his number of tricks, he pockets a corresponding sum from each player, and the game recommences; should he fail, he has to pay to each player a sum corresponding to the number of tricks.

Napa, nä'pä, Cal., city, county-seat of Napa County; on the Napa River, and on the Southern Pacific railroad. It is in an agricultural region in which large quantities of fruit are raised; and in the vicinity is an extensive deposit of cement rock. It was settled in 1847 and in 1863 was incorporated. The city has excellent transportation facilities as the Napa River is navigable, thus making direct water communication with San Francisco and other cities. The chief manufactures are gloves, woolen goods, leather, shoes, and canned goods. There is a large trade in fruit, Portland cement (made at Napa Junction), and the manufactures of the city. The scenery around Napa is beautiful; some of the attractions are the petrified forests, the mineral springs, and the Napa Redwoods. It has the State Hospital for the Insane. Pop. (1890) 4,395; (1900) 4,036.

Napanee, Canada, a port of entry and the county-seat of Lennox County, 24 miles west of Kingston, on the bay of Quinté, at the outlet of the Napanee River. It is the terminus of the Quinté & Napanee railroad, and is on the Grand Trunk railway. It has mills, factories, and a considerable grain trade. Pop. (1901) 3,143.

Naperville, nā'pẽr-vĭl, Ill., city, in Du Page County; on the Du Page River, and on the Chicago, Burlington & Quincy railroad; about 28 miles west of Chicago. It was settled in 1830 and in 1857 was incorporated. It is in an agricultural region, and in the vicinity are stone quarries. It is chiefly a residential city, the seat of the Northwestern College, established in 1861 under the auspices of the Evangelical Association. It has good public and parish schools and the Nichols Library. Pop. (1890) 2,216; (1900) 2,629.

Naphtali, năf'ta-lī (Hebrew, "wrestler"), the 7th son of Jacob by Bilhah, Rachel's maid, one of the 12 patriarchs and eponymous founder of one of the 12 tribes of Israel. The territory of Naphtali lay to the northwest of the Sea of Galilee; of this tribe was Barak, the hero and deliverer of Israel in the days when Deborah, the wife of Lapidoth, judged Israel. This frontier tribe was exposed to the incursions of the adjoining heathen, and is specially mentioned in the Song of Deborah as among those who "jeoparded their lives under the death" in the battle against Jabin the Canaanite king. Tiglathpileser when he overran the north of Palestine carried off the whole population to Assyria, after which Naphtali disappears from history. The district became famous under the name of Galilee as the home of Jesus Christ and most of his apostles. Capernaum, Tiberias, Magdala and Chorazin lay within the ancient boundaries of the tribe of Naphtali.

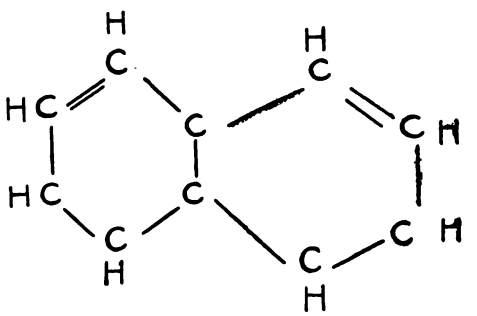
Naphtha, in chemistry, among the ancients, all inflammable liquids, especially the more fluid sorts of asphalt or bitumen; the word, which is of Persian origin and signifies "moist" being first used of Persian product and then applied more generally. In modern continental usage and among chemists the term is applied to any inflammable liquid product of organic decomposition. Thus mineral or native naphtha is only another name for kerosene or petroleum (q.v.). Commercially the word has still a third usage, for all the lighter products of petroleum distillation, namely the hydrocarbon spirits, as distinct from the safer and heavier hydrocarbon oils. Similar distillation products from coal-tar, peat, wood, india-rubber, bones, etc., are also called naphthas. These vary in density from 0.67 to 0.72, and in gravity from 90° to 60° Beaumé. American crude petroleum naphtha, which constitutes from 6 to 20 per cent of the crude petroleum, is refined into various grades, gasoline, benzine, and benzoline being the most important. Russian petroleum is only 5 or 6 per cent naphtha. Scotland produces a naphtha called shale-spirit, being 4 or 5 per cent of the crude shale oil, and rather heavier than most other naphthas, but not so heavy as the coal tar naphthas, which vary in specific gravity between .850 and .950. Caoutchine is another name for india-rubber naphtha. The uses of naphtha are various, the lighter grades being utilized as detergents in dyeing, clothes and glove cleaning; and the coal-tar naphthas are largely employed as solvents in making india-rubber goods. The Scotch shale-spirit is the most important component of a wood preservative. Naphtha in general, and gasoline in particular, are largely used for power producers in automobiles. Carburetting gas and the extraction of perfumes from flowers are two widely different uses of naphtha. The production of naphtha in the United States averages nearly 20,000,000 gallons annually. The figures for 1901 and 1902 are as follows:

NAPHTHA PRODUCTION IN THE UNITED STATES.

Year	Gallons	Value
1901	21,685,000	$1,742,000
1902	19,683,000	1,393,000

Naphtha-poisoning. See Petroleum-poisoning.

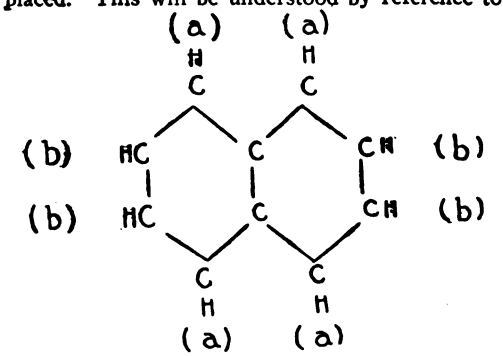
Naphthalene, or **Naphthalin,** a coal-tar product consisting of carbon and hydrogen, with the chemical composition $C_{10}H_8$, closely related to benzol. Its peculiar chemical composition may be represented by the graphic formula:



Naphthalene is prepared by the distillation of coal-tar at a temperature between 180° and 220° C. The residue crystallizes on cooling, is then compressed, warmed, after the addition of sulphuric acid, and either sublimated or distilled. Physically, naphthalene is a white solid, with brilliant, leafy crystals, melting at 80° C. to a colorless liquid, boiling at 218° C., combustible with a sooty flame and pitchy odor. It is insoluble in cold water, slightly soluble in water at a higher temperature, and easily soluble in the essences, in boiling alcohol, or in ether. Naphthalene forms various compounds, mostly by simple addition; the most important are the various sulphonic acids, such as $C_{10}H_7SO_3H + H_2O$, used in the manufacture of dyes. Mixed with camphor, to counteract its peculiar odor, naphthalene is used to keep moths and other insects from clothes. Consult Täuber and Norman, 'Die Derivate des Naphthalin welche für die Technik Interesse besitzen' (1896).

Naphthamein, năf-thăm'ẽ-ĭn, a coal-tar color, obtained by treating an aqueous solution of naphthylamine hydrochloride with ferric chloride, naphthamein then separating as an amorphous purple precipitate. Naphthamein is insoluble in water, alkalies, and dilute mineral acids, but it dissolves readily in acetic acid and in ether. When used as a dye, it gives colors ranging from a gray-violet to a gray-brown; but the dye is not fast, and fades upon exposure to light. Naphthamein is also known as "naphthalene violet," and its chemical formula has not yet been definitely determined.

Naph'thol, in chemistry, a substance derived from naphthalene in the same way that phenol is derived from benzene,—that is, by replacing one of the hydrogen atoms of the hydrocarbon by a molecule of hydroxyl, OH. The empirical formula for naphthalene being $C_{10}H_8$, the corresponding formula for naphthol therefore is $C_{10}H_7.OH$. In benzene the substitution can be made in only one way, because the molecule of that substance is chemically symmetrical, its hydrogen atoms being all similarly related to one another, and to the carbon atoms. In naphthalene, however, two essentially different kinds of substitution are possible, according to the position of the hydrogen atom that is replaced. This will be understood by reference to



the structural formula of naphthalene, as presented herewith. The hydrogen atoms in the positions marked "a" are more directly associated with the central pair of carbon atoms than are those in the positions marked "b"; and we must therefore admit that two chemically different naphthols are possible, according as the hydrogen that is replaced by hydroxyl is an "a" atom or a "b" atom. These two naphthols are in fact known, and to distinguish them from each other the prefixes "alpha" and "beta" are attached to the name. Thus "alpha-naphthol" is the compound obtained by replacing one of the "a" hydrogen atoms by OH, and "beta-naphthol" is the compound obtained by a similar replacement of a "b" atom. Both of the naphthols resemble ordinary phenol (or carbolic acid), and both are used as antiseptics, and also in the preparation of certain of the coal-tar colors. The naphthols exist in coal-tar, and may also be prepared by the action of sulphuric acid upon naphthalene, followed by treatment with sodium hydroxid; the actual details of the manufacture require considerable technical knowledge, however, and for them reference must be made to the advanced works on organic chemistry, and the chemistry of the coal-tar products. (See the references under COAL-TAR COLORS.) Alpha-naphthol crystallizes in short trimetric prisms, which melt at 201° F. and boil at 534° F. Beta-naphthol crystallizes in flat plates or tablets, melts at 253° F., and boils at 547° F. Both are slightly soluble in hot water, and both dissolve freely in alcohol, ether and benzene.

Naphthyl, a hydrocarbon radical $C_{10}H_7$, occurring in the compounds and derivatives of naphthalene. It is a merely hypothetical group as it appears only in compounds. If its existence be assumed, naphthalene ($C_{10}H_8$, or $C_{10}H_7.H$) is merely its hydrid; naphthol or naphthyl alcohol in the same way might be considered a hydrate of naphthyl, since its formula may be written $C_{10}H_7OH$. Dinaphthyl ($C_{20}H_{14}$) is a carbide formed by the action of heat upon napththalene; it is a solid and is fusible at 154° C.

Napier, nā'pĭ-ẽr, SIR **Charles,** British naval commander, cousin of Sir Charles James and Sir William Napier (q.v.): b. Merchiston Hall, Stirlingshire, 6 March 1786; d. Merchiston Hall, Hampshire, 6 Nov. 1860. At 13 he entered the navy as a volunteer, and in 1805 was promoted lieutenant. In 1807 he became commander, and from the gallantry displayed by him in 1809 in the pursuit of three French line-of-battle ships, was shortly after made post-captain. Debarred from active service by his promotion, he joined the British army in Portugal and took part in the battle of Busaco. In 1814 he was despatched to the United States, where he led an expedition against Baltimore. In 1829 he received the command of the Galatea, in which he was employed on the coast of Portugal and the Azores. Becoming acquainted with the Duke of Terceira and other constitutionalists, he accepted the command of their fleet, and by his defeat of the Miguelites in a naval engagement effected the relief of Oporto and the establishment of Donna Maria on the throne. For his services the Portuguese government created him Viscount da Capo San Vincent, and nominated him admiral-in-chief. He soon returned to England, and in 1839 was ordered to the Mediterranean, where, on the outbreak of the war between Mehemet Ali and the Porte, and the co-operation of Britain with Russia and Austria on behalf of the latter power, he performed some of his most gallant exploits, including the storming of Sidon and the capture of Acre. Having blockaded Alexandria, he concluded on his own responsibility a convention with Mehemet Ali, by which the latter and his family were guaranteed in the hereditary sovereignty of Egypt on resigning all claim to Syria. In 1841 he was elected member for Marylebone, and proved himself a warm advocate of liberal measures and naval reform. In 1847, while in command of the Channel fleet, he compelled the emperor of Morocco to grant compensation for the injuries inflicted by him on British commerce. On the commencement of the Russian war he was nominated to the command of the Baltic fleet, but in this capacity had few opportunities for striking a decisive blow, which at the time somewhat disappointed his country. Sir Charles Napier was an author as well as a commander and published 'The War in Portugal' (1836); 'The War in Syria' (1842); 'The Navy, its Past and Present State' (1851). Consult: Elers Napier, 'Life and Correspondence of Admiral Sir Charles Napier' (1862).

Napier, SIR **Charles James,** English soldier and administrator: b. London 10 Aug. 1782; d. Oaklands, near Portsmouth, Hampshire, 29 Aug. 1853. He entered the army as ensign in his 12th year and within four months was gazetted lieutenant. Having become captain in 1803, he accompanied his regiment to the Peninsula, and distinguished himself at Coruña, where he had the rank of major, and where, after receiving five wounds, he was taken prisoner. In 1810, when again at liberty, he returned to the Peninsula, and fought at Busaco. After obtaining the rank of colonel, and taking part in most of the leading events of the Peninsular campaigns, he re-

turned to England on the conclusion of the peace. He was in the United States during the War of 1812, and after his return took part in the storming of Cambrai in 1815. From 1822 to 1830 he was governor of the island of Cephalonia, where he pleased the inhabitants better than the authorities at home. In 1841 he sailed for the east to assume the chief command within the presidency of Bombay. He was shortly afterward called to Scinde, in consequence of the determination of Lord Ellenborough, then governor-general, to punish the Ameers for alleged misconduct during the Afghan war. This policy was ably carried out by Napier, first by the splendid victories of Meanee (17 Feb. 1843) and Hyderabad (24 March), and afterward by the administration of Scinde as a conquered province, of which Lord Ellenborough made him governor. He retired in 1841, but during the Sikh war of 1848–9 he sailed once more for the East as commander-in-chief of all the forces in India. Having taken a step which subjected him to an unceremonious rebuke from the Marquis of Dalhousie, the governor-general, he threw up his appointment and returned to England the next year. Consult: Bruce, 'Life of General Sir Charles Napier' (1885); Butler, 'Sir Charles Napier' (1890).

Napier, Henry Edward, English naval officer and author: b. 5 March 1789; d. 13 Oct. 1853. He was the youngest brother of Sir Charles James Napier (q.v.). He entered the British navy in 1806, served in the East Indies in 1808–11, became lieutenant in 1810, commanded the Goree and later the Rifleman in the Bay of Fundy, was placed on half-pay in 1815, and in 1830 was made captain on half-pay. In 1820 he was elected a fellow of the Royal Society. He published a valuable six-volume 'Florentine History' (1846–7), from the earliest authentic records to the time of Ferdinand III.

Napier, John, Scottish mathematician: b. Merchiston, near Edinburgh, 1550; d. there 4 April 1617. He was educated at St. Andrews, traveled on the Continent, returned to a life of proprietorship and leisurely study, and published in 1593 his 'Plaine Discovery of the Whole Revelation of Saint Iohn,' in the dedicatory letter of which he proceeded to give James VI. some advice. For a time he busied himself with devising instruments of war, such as burning-glasses for firing hostile vessels; a piece of artillery for destroying everything round the arc of a circle; and a round metal chariot, from which shot might be fired through small openings while the enemy became "abased and altogether uncertain." Sir Thomas Urquhart ('The Jewel' 1652) says that the artillery was tried on a Scottish plain with the slaughter of many sheep and cattle. His great work 'Mirifici Logarithmorum Canonis Descriptio' appeared in 1614. This explained the nature of logarithms (q.v.), then styled "artificial numbers," and supplied the table for their application. It astonished Europe, and deeply interested Kepler, who helped to extend the use of logarithms. With Henry Briggs Napier devised the new canon in which 0 represented the logarithm of unity and 10,000,000,000 that of the entire sine. His 'Mirifici Logarithmorum Canonis Constructio' (1619) explained the method of constructing the table; and the 'Rabdologiæ' (1617) was a description of enumeration by bone or ivory rods, which, known as "Napier's rods," were widely employed in Europe for assistance in multiplication, division, and the extraction of the square and cube root. Consult Mark Napier, 'Memoirs' (1834).

Napier, Robert Cornelis, Lord Napier of Magdala, English soldier: b. Ceylon 6 Dec. 1810; d. London 14 Jan. 1890. Educated at the Military College, Addiscombe, he entered the Bengal Engineers, and during the second Sikh war (1848) was present as chief engineer at the siege of Multan, and after its fall took part in the battle of Gujarat. When the Mutiny broke out in 1857 he was appointed chief of the staff to Sir James Outram, and in the second relief of Lucknow it was he who constructed the engineering works which enabled Sir Colin Campbell to capture the city. In the Chinese campaign of 1860 he was second in command, and in 1865 became commander-in-chief of the Bombay army. He commanded in 1868 the expeditionary force against King Theodore of Abyssinia, defeated the king's forces, released the English prisoners, and stormed the mountain fortress of Magdala (April 1868). For his services in this short but brilliant campaign he was rewarded with a peerage and a pension. Subsequently he was appointed commander-in-chief in India (1870), governor of Gibraltar (1876), and constable of the Tower (1887). At his death he was buried in St. Paul's with military honors. Consult Markham, 'History of the Abyssinian Expedition' (1869).

Napier, Sir William Francis Patrick, British soldier and author, brother of Sir Charles James Napier (q.v.): b. Castletown, Kildare, England, 17 Dec. 1785; d. Scinde House, Clapham, Surrey, 12 Feb. 1860. At 14 he entered the army, with his brothers Charles and George took a distinguished part in the Peninsular campaigns, receiving seven decorations for the share borne by him in as many principal actions, including Busaco, Salamanca, the Nivelle, and Orthez. Some years later he began his celebrated 'History of the War in the Peninsula and in the South of France from 1807 to 1814' (1828). It furnishes the best and most interesting record existing of the momentous transactions which it chronicles, though from its opposition to the prevailing politics of the day its merits were at first insufficiently appreciated. In 1841 he was advanced to the rank of major-general, was appointed lieutenant-governor of Guernsey the following year, and in 1848 created a K.C.B. Criticisms on his brother's proceedings in India called him forth as a champion on his behalf, and he produced successively the 'Conquest of Scinde' (1845); 'History of Sir Charles Napier's Administration of Scinde' (1851); and 'Life and Opinions of the Late Sir Charles Napier' (1857). He also wrote 'English Battles and Sieges in the Peninsula.' Consult 'Life' by Lord Aberdare (1864).

Napier of Magdala. See Napier, Robert Cornelis.

Napier's Rods, in mathematics a set of rods contrived by John Napier in 1617 for the purpose of facilitating the numerical operations of multiplication and division. They consist of pieces of bone, or ivory, in the shape of a parallelopipedon, about three inches long and three

tenths of an inch in width, the faces of each being divided into squares, which are again subdivided on 10 of the rods by diagonals into triangles, except the squares at the upper ends of the rods. See CALCULATING MACHINES.

Naples, nā'plz, Italy, the capital of the province of Naples, and previously of the former kingdom of the Two Sicilies (q.v.), the largest city and second seaport of the kingdom, situated on the celebrated Bay of Naples, 160 miles by rail southeast of Rome. Its site is of singular beauty, occupying an area about five miles long and three miles broad, on the north side of the nearly semicircular bay, partly along the shore and partly climbing the adjacent slopes. It is bounded on the one side by the picturesque heights of Posilipo, and on the other by the lofty, volcanic mass of Vesuvius (q.v.). The environs are densely peopled, among neighboring towns and villages being Portici, Resina, Castellamare, Casoria, Pozzuoli, etc., and the classic sites of Herculaneum and Pompeii (qq.v.) all connected by rail. The bay, 20 miles wide, and extending inward 10 miles, with a coast line of about 35 miles, has Cape Miseno as its northwest extremity, off which lie the islets of Procida and Ischia; Campanella Point forms the southeast extremity, with the beautiful isle of Capri lying beyond. The city is divided into two unequal parts by a steep ridge projecting from the height on which stands the castle of St. Elmo, and terminated by a rocky islet surmounted by the Castello dell' Ovo. The largest and most ancient part of Naples lies to the east of these heights. This now forms the business quarter and is intersected from north to south by the main street, the Via di Roma. The western and more modern part of the city, the fashionable quarter, has a superior situation, and commands magnificent views; the chief street in this quarter is the Corso Vittorio Emanuele, nearly three miles long. The streets are mostly well paved with lava or volcanic basalt, and the houses are large, lofty, and solidly built, and have flat roofs. Since the cholera epidemic of 1884 a plan of municipal improvement on an extensive scale has been carried out, including a new water supply, a modern sewerage system, the destruction of the narrow streets, alleys, and lanes, the former abodes of filth, misery, vice, and crime, and the building of new quarters, with wide thoroughfares and modern houses. There are few remains of ancient times, but there are five castles, dell' Ovo, Nuovo, del Carmine, Capuano, St. Elmo, the gates Porta del Carmine and Capuano, all of mediæval construction, and Virgil's tomb.

Among the chief public edifices is the cathedral, dating from 1272, a large Gothic building erected on the site of two temples dedicated to Neptune and Apollo. It is held in high veneration in consequence of possessing the relics of St. Januarius or Gennaro, including the phial of his blood which liquefies miraculously on certain occasions. Other edifices are the church De' Santi Apostoli, said to have been originally founded by Constantine the Great on the site of a temple of Mercury; the church of St. Paul, built in 1817–31 in imitation of the Pantheon at Rome; the Palazzo Reale (Royal Palace), a building of great size in the lower part of the town; the palace of Capo di Monte, situated on a height in the outskirts; the old palace, where the courts of justice now hold their sittings; the Palazzo dei Pubblici Studj, formerly occupied by the university, but now converted into the Museo Nazionale, a museum containing not only a valuable library of 275,000 volumes and many rare MSS., but also the older and more recent collections belonging to the crown, the Farnese collection of paintings and sculpture from Rome and Parma, and an unequaled collection of gems, bronzes, vases, etc., chiefly obtained from the excavations of Pompeii and Herculaneum. Naples has a university, dating from 1224, and attended by over 3,000 students; many other educational institutions, including the celebrated zoological station with marine aquarium and laboratory, and numerous hospitals and charitable foundations. The manufactures, which are numerous but individually unimportant, include macaroni, woolens and cottons, silks known as *gros de Naples,* glass, china, musical instruments, flowers and ornaments, perfumery, soap, chemicals, machinery, etc. The harbor accommodation has recently been extended, and the trade is important. The exports consist chiefly of bones, cream of tartar, hoops, linseed, hemp, wheat, figs, gloves, licorice, madder, coral, macaroni, oil, wine, wool, tallow, rags, and silk, raw, dyed, and manufactured. Naples is one of the most densely populated cities of Europe, and one of the features of the city is its unique population, which swarms incessantly in the thoroughfares, where throngs of sellers, buyers, and idlers intermingle with asses, mules, hand carts, and vehicles, dazzling the eye with their brilliant variety of costume, and the expressiveness of their frantic gestures and attitudes, while the ear is stunned by the shrill cries of the itinerant dealers, the songs of the improvisatore, and the high-pitched patois of the seething crowds. The Marinella, an open beach fronting the east part of the city, was formerly the abode of the lazzaroni, a class which has now lost its distinctive features, the term being now generally applied to the fishermen.

Naples was founded by a Greek colony from the town of Cumæ many centuries before Christ. It took the name of Neapolis ("New City") to distinguish it from a still older Greek city adjoining called Parthenope. It passed to the Romans in 290 B.C. In 536 A.D. it was taken by Belisarius, and was pillaged by Totila in 542. In 1130 the Norman Robert Guiscard united the south of Italy and the adjacent island of Sicily into one political unity, Naples being recognized as the metropolis. It was afterward successively under the sway of the emperors of Germany, and the kings of France and Spain. Under the latter it became the capital of an independent kingdom, but having been brought within the vortex of the French Revolution, was handed over by Napoleon, first to his brother Joseph, and then to his brother-in-law Murat. The Congress of Vienna having restored the legitimate sovereignty, Naples received back its former masters. After a long period of misrule they were ejected by Garibaldi in 1860, and Naples was then incorporated into the kingdom of Italy. Pop. (1901) 563,751.

Naples Yellow, or Neapolitan Yellow, a permanent orange-yellow pigment much used in oil painting and in glass and porcelain painting. It is prepared by fusing at a moderate heat, for

two hours, a mixture of chemically pure antimonis-tartrate of potash, lead nitrate and sodium-chloride. When cooled the common salt dissolves, leaving a fine yellow powder.

Napo, nā'pō, Ecuador, an affluent of the Amazon, which rises on the north side of Cotopaxi, and after a southeasterly course of about 800 miles, forming for a considerable distance the boundary between Colombia and Ecuador, joins the Amazon just beyond the eastern boundary, at Corocha, Peru. It is navigable nearly 500 miles for steamers; it flows through a region rich in mineral and vegetable wealth, but comparatively destitute of inhabitants.

Napoleon I., emperor of the French: b. Ajaccio, Corsica, 15 Aug. 1769; d. Longwood, Saint Helena, 5 May 1821. He was descended from the Italian family of Bonaparte (q.v.), of which the Corsican branch through him became the historic representative. Napoleon Bonaparte was the son of Charles Bonaparte, an advocate of some repute, and of Letitia Ramolino, whose family were Florentines. Of 13 children born to them, he was the fourth, and was the second son. At 10 he was sent to the military school of Brienne, where he remained till 1784. His school companions regarded him as taciturn and morose; but as he was a Corsican, speaking very little French, and poor as well as proud, his conduct is doubtless to be ascribed as much to his circumstances as to his temperament. Toward those who, like Bourrienne, showed him sympathy, he was susceptible of strong and lasting attachments. From the annual report of the school it appears that he "distinguished himself in mathematics, was tolerably versed in history and geography, weak in Latin, general literature, and other accomplishments; of regular habits, well behaved and studious, and enjoying excellent health." His favorite author was Plutarch. In October 1784 he repaired to the military school at Paris to complete his studies for the army; and in September 1785 received his commission as second lieutenant in the artillery regiment of La Fère. Soon afterward he was promoted to be first lieutenant in the regiment of Grenoble, then stationed at Valence. While here he devoted some attention to literature, gaining a prize offered by the Lyons Academy. He had the intention of describing an excursion he made to Mont Cenis in the style of Sterne's 'Sentimental Journey,' then much in favor on the Continent; but a much more suitable task was a 'History of Corsica,' which he began and communicated to Paoli, then living in exile in London.

Meantime the Revolution was rapidly developing. Many of Napoleon's fellow officers at Valence openly took part with the royalists, but he chose the popular side, though in a quiet and undemonstrative way, as he had little liking for the turbulence of mobs. On 6 Feb. 1792 he became captain of artillery by seniority and, being in Paris the same year, he witnessed the insurrections of 20 June and 10 August. He was accompanied by his friend and biographer Bourrienne (q.v.), who relates that on one of these occasions, when Napoleon saw the mob break into the Tuileries and force the king to don the red cap, he exclaimed, "It is all over with that poor man! A few discharges of grape would have sent all those despicable wretches fleeing!" Soon after he left for Corsica, where Paoli then held the chief command. The excesses of the Septembrists and Terrorists, however, induced Paoli to break with the Convention and seek the assistance of England. This brought him into conflict with Napoleon, who adhered to the Convention, which so exasperated the Corsicans against him that after a few skirmishes he was driven from the island along with his whole family. He made a short stay at Marseilles, where he published a small pamphlet, 'Le Souper de Beaucaire,' Republican in sentiment, but not Jacobinical, as has been asserted. He then set out for Paris, where he spent a part of the summer of 1793; and in September of that year was sent, with the commission of lieutenant-colonel of artillery, to assist in the reduction of Toulon, then in the hands of the English. The place was captured 19 December entirely through his strategic genius; and in the following February he was made a brigadier-general of artillery. Later in the year he was sent to Genoa to examine the state of the defenses of that city and to ascertain the political disposition of its inhabitants.

In the beginning of 1795 he was again in Paris in search of employment, but in spite of his known abilities was not at first successful. In his letters to his brother Joseph, written about this time, he complains of poverty and ennui, and seems to have thought of offering his services to the Sultan of Turkey. On the 13th Vendémiaire IV. (5 Oct. 1795), when the sections of Paris had risen against the Convention, Napoleon, named by Barras (q.v.), was commander of the 5,000 troops provided for its defense. Although he had had but a night in which to make arrangements for the dispersion of the populace, when the National Guards, as the defenders of the sections were called, advanced to the number of 30,000 along the quays of the Seine, the Rue St. Honoré, and the other approaches to the Tuileries, they found every point securely guarded. To their feeble musketry fire Napoleon replied by murderous discharges of grape. In less than an hour of actual fighting victory was secured for the Convention, which recognized the value of the young victor's services by appointing him to the command of the Army of the Interior.

About this time he made the acquaintance of Josephine Beauharnais, to whom he proposed marriage and was accepted. The ceremony took place 9 March 1796, and less than a week afterward he had to depart to assume the command of the army of Italy, which for three or four years had been carrying on a desultory warfare against the Sardinians and the Austrians amid the defiles of the Alps and the Ligurian Apennines. His army consisted of only 40,000 men, and even those were badly fed and clothed, while the allies could oppose him with a much larger force. In the end of March he set out from Nice and came up with the allies at Montenotte, and inflicted on them a disastrous defeat (11 April). This victory separated the Sardinian from the Austrian army, and Napoleon, determined to crush them in detail, pursued the former and beat them at Millesimo (13th and 14th), and then fell on the latter at Dego (14th and 15th).

This opened up for him both the route to Turin and to Milan. Napoleon lost no time; the Sardinians, who were retiring upon Turin,

NAPOLEON BONAPARTE.

AFTER A PAINTING BY PAUL DELAROCHE.

Mau

were overtaken and beaten at Mondovi (22d), and compelled to sue for peace; and the Austrians, who were falling back on Milan, were signally defeated at the battle of Lodi (10 May). On the 15th he entered Milan, where heavy contributions were levied on the state, and the principal works of art were seized and sent to Paris. Naples, Modena, and Parma hastened to conclude a peace; the Pope was compelled to sign an armistice; and the whole of northern Italy was in the hands of the French. Mantua was the next object of attack. Wurmser, at the head of large Austrian reinforcements, advanced through the Tyrol to its defense; he was defeated at Castiglione 5 August and again at Bassano 8 September, which compelled him to take refuge behind the walls of Mantua. Not yet disheartened, Austria sent a third army in two divisions under Marshal Alvinczy and General Davidovich. This for a while held the French in check, but on 15 November a battle was begun at Arcole, which, after three days of hard fighting, gave the victory again to the French, and decided the result of the campaign. In January 1797, Alvinczy opened a fresh campaign by advancing at the head of 50,000 troops from Roveredo to the relief of Mantua, but was completely routed by Napoleon on the 14th at Rivoli; and on 2 February Wurmser was compelled by famine to surrender at Mantua. On the same day Napoleon put an end to the armistice with the Pope, and invaded the States of the Church, beat the papal troops on the Senio, and took in quick succession the towns of Faenza, Ancona, Loretto, and Tolentino. On the 19th the Pope was compelled to conclude a peace by which he surrendered Avignon, Bologna, Ferrara, and the Romagna to France. Napoleon next entered the Tyrol, driving before him the Archduke Charles, who had undertaken another invasion of Italy. An armistice was agreed upon, 7 April, and Austria gave territory and indemnity to France, receiving Venetia in return. This closed the great Italian campaigns, in which Napoleon, by ingenuity of plan, celerity of movement, and audacity in assault, far outgeneraled all his antagonists.

In December 1797 Napoleon returned to Paris; the enthusiasm of the Parisians was immense, and the festivals in his honor innumerable. About this time the Directory seems to have had the intention of invading England, and had brought an army together for that purpose. The command was conferred on Napoleon, who at first professed to favor the design, but who well knew its impracticability. It has been thought by many that this proposal was merely a feint to cover the real design of the Directory, namely, the invasion of Egypt, as a preliminary step to the conquest of British India. By 10 May 1798 an army of 36,000 men was collected and embarked at Toulon in a fleet commanded by Brueis (q.v.). A body of scientific and artistic explorers accompanied it. On 9 June the French landed at Malta, and the next day took possession of the island, in which they left a garrison. Ten days after the fleet resumed its voyage, reaching Alexandria on 1 July, and that city being taken, Napoleon and the army advanced on Cairo. Here they encountered a large body of Mamelukes, which, after a long and bloody struggle, known as the battle of the Pyramids, they repulsed. Many of the surrounding tribes thereupon submitted to the French, who thus for a while held a seeming possession of the whole of Egypt. Thinking himself secure in his conquest Napoleon immediately set about reorganizing the civil and military government of the country; but fortune was preparing for him a terrible reverse. The English admiral Nelson, who had long been in pursuit of his fleet, found it moored in the bay of Abukir, and, with the exception of four vessels which contrived to escape, utterly destroyed it.

All means of return to Europe for the French were thus cut off, and to add to their misfortunes the sultan declared war against them, and a short time after serious disturbances broke out in Cairo, which were only suppressed by horrible massacres. Napoleon resolved to meet the Turkish forces assembling in Syria. In February 1799 he crossed the desert with about 13,000 men; took El-Arish and Gaza, and stormed Jaffa, where a great number of Turkish prisoners were deliberately massacred. On the 17th he reached Acre, which was defended by a Turkish garrison under Djezzar Pasha, assisted by Sir Sydney Smith and a small body of English sailors and marines. After 60 days he gave up the siege and returned to Egypt, leaving the whole country on fire behind him. He reentered Cairo 14 June, having lost 4,000 men in the Syrian expedition. About the middle of July the sultan landed a force of 18,000 at Abukir, which Napoleon attacked and almost annihilated on the 25th. His position was far from agreeable, however; he had signally failed in the great objects of his expedition, and besides news had reached him of disaster to the French arms in Italy and of confusion in Paris. On 22 August he embarked in a frigate and 9 October landed at Fréjus, having narrowly escaped capture several times by the British Mediterranean cruisers. He arrived in Paris in time to take advantage of the political intrigues then rife. The credit of the government was wholly gone, and its authority over its generals impaired. A revolution in the government 18 June had not made new directors more competent than their predecessors. Another change became necessary. Napoleon secured the co-operation of Moreau and the other generals then in the capital, and abolished the Directory on the 18th and 19th Brumaire (9–10 November). A new constitution was then drawn up, chiefly by the Abbé Siéyès, under which Napoleon was made first consul. As, however, he had the power of appointing to all public offices, of proposing all public measures in peace and in war, and the entire command of all administrative affairs, both civil and military, he was virtually ruler of France.

From this time Napoleon's policy developed itself more distinctly; its objects were to establish order at home and to humiliate the enemies of the nation; but personal aggrandizement was an end scarcely less conspicuous. With sagacity, activity, and boldness he undertook to reform civil affairs. He recruited the national treasury by various expedients, repealed the more violent laws passed during the Revolution, such as punishment for matters of opinion, reopened the churches and suppressed the Vendean insurrection by a series of decided but conciliatory measures. But he was well aware that his genius was essentially military, and that his most

striking triumphs were those won on the battle-field. He offered Austria, England, and Turkey, in theatrical phrases, terms of peace, which were rejected. He resolved to strike a blow first at Austria by a renewal of the glories of his former Italian campaign. An army of 36,000 men was concentrated with unparalleled rapidity and secrecy on the shores of the Lake of Geneva. On 13 May 1800 he began his daring march across the Great Saint Bernard, and almost before the Austrian General Melas was aware, had entered Milan (2 June). After several unimportant skirmishes he encountered the Austrians at Marengo (14 June), where he achieved another brilliant victory, which put all the Piedmontese fortresses, for the second time, in possession of the French.

Having established provisional government at Milan, Turin, and Genoa, he returned to Paris 3 July. As his general, Moreau, had defeated the Archduke John in the decisive battle of Hohenlinden (3 December), Austria was reduced to sue for peace, and on 9 Feb. 1801 signed the treaty of Lunéville, which was mainly based on that of Campo Formio. Treaties were subsequently concluded with Spain, Naples, the Pope, Bavaria, Portugal, Russia, Turkey, and finally, 27 March 1802, the Peace of Amiens. Thus it seemed as if a universal cessation of hostilities were about to mark the history of Europe, and allow Napoleon the opportunity to crush the insurrection of the blacks in San Domingo. An army was sent out under Leclerc, some 20,000 of which were swept away by disease or the sword; the blacks were provoked by brutal cruelties to still more fearful massacres, in which about 60,000 whites perished. Toussaint l'Ouverture, an able and courageous negro who had made himself the leader of his unfortunate countrymen, was seized during a truce and carried to France, where he died in prison.

But the great occupation of Napoleon was the improvement of the interior affairs of the nation. A general amnesty allowed all the *émigrés* to return home; the Legion of Honor, a new order of knighthood, was established. Considerable attention was paid to such departments of education as tended to promote efficiency in the public service. Mathematics and physical science were encouraged at the expense of philosophy, ethics, and social and political science. All prefects of departments and all mayors of cities were appointed by Napoleon, so that not a vestige of provincial or municipal freedom remained. On 2 Aug. 1802, Napoleon was proclaimed by a decree of the senate consul for life, a step confirmed by a plebiscite of 3,000,000 votes. A *senatus consultum* issued some days after, reconstructing the electoral bodies and reducing the tribunate to 50 members, showed, however, that Napoleon was not yet satisfied with the authority he was clothed with, and many persons saw in the movement a step toward still more absolute power. It is to this period that the greatest of his services to France belongs. He assembled the first lawyers in the nation, under the presidency of Cambacérès, to draw up a code of civil laws. (See CODE, *Code Napoléon.*)

Meanwhile the state of Europe was beginning to look serious. Disturbances in Switzerland in the early part of 1802 induced Napoleon to resort to an armed mediation in its affairs; in August of the same year Elba was incorporated with France, Piedmont 11 September, and Parma in October. England regarded these proceedings as an infringement of the treaty of Amiens, and as remonstrances were ineffectual, there was in a short time a resumption of hostilities. On 18 May 1803, England declared war against France, having laid an embargo on all French ships in British ports. France retaliated by a decree that all Englishmen found on her territory should be detained as prisoners of war; and General Mortier was sent to occupy Hanover, as belonging to Great Britain. While these events were taking place a conspiracy for the overthrow of the first consul and the re-establishment of the Bourbons was discovered and thwarted. Napoleon pretended to see an accomplice of the conspirators in the Duc d'Enghien, and caused him to be arrested in neutral territory, brought to Vincennes and, after a mock trial, shot. Napoleon now seems to have thought it necessary that he should assume the imperial dignity. An appeal was made to the nation, and upward of 3,000,000 votes were given in favor of conferring on him the title and prerogatives of emperor, while less than 3,000 were against it. On 18 May 1804 Napoleon assumed the imperial title; and in order that due solemnity should not be wanting, he requested Pius VII. to perform the ceremony of his coronation. The Pope assented and went to Paris 2 December. He was only allowed to perform part of the ceremony, however, as Napoleon snatched the crown from the pontiff's hands and placed it on his own head, performing a like office for his consort Josephine. On 26 May 1805 he was also crowned king of Italy in the Cathedral of Milan; and Eugène Beauharnais, his stepson, was appointed viceroy. He created a nobility with sounding titles; surrounded himself by a brilliant court; established all the etiquette of royalty; and introduced many practices marked by ostentation and parade.

Meanwhile the Northern powers listened to the solicitations of England, and united in a coalition against the new emperor. Russia, Austria, and Sweden all joined in the charges of aggrandizement laid against Napoleon by the English government; but Prussia, tempted by him with the promise of Hanover, could not be brought to enter the coalition. The emperor abandoned his design of making a descent on England, broke up the camp at Boulogne, and concentrating his widely scattered forces at Mainz, September 1805, he marched at once across Bavaria at the head of 180,000 men, and compelled the Austrian general Mack to capitulate at Ulm, with 23,000 men (20 October). On 13 November he had reached Schönbrunn, near Vienna, where he received news of the victory of Nelson at Trafalgar, over the united fleets of France and Spain. Entering the Austrian capital, he made rapid preparations to meet the combined armies of Russia and Austria, then concentrating on the plains of Olmütz. On 2 December the three armies, each commanded by an emperor, met at Austerlitz. The struggle was desperate and long but at last victory was won by Napoleon. The rout of the allies was complete. The Austrian emperor instantly sued for peace, giving up to France all his Italian and Adriatic territories. The Russian emperor retired behind his own frontiers, and Hanover was handed over

to Prussia. As the king of Naples had received English and Russian troops into his dominions, Napoleon construed this act into one of direct hostility. In February 1806 a French army occupied the continental part of the Neapolitan States, of which Joseph Bonaparte was declared king on the deposition of their former sovereign. The Batavian republic was transformed into a kingdom dependent on France and given to another brother of the emperor, Louis, who took the title of King of Holland. Various districts in Germany and Italy were erected by the conqueror into dukedoms and bestowed on his most successful generals.

But the most important change of all was the formation of the Confederation of the Rhine on 12 July, and the dissolution of the old German empire. On the death of the English minister, Pitt, and the accession of Fox, negotiations were entered into for the cessation of hostilities between France and England, and as propositions were entertained toward the restoration of Hanover, the eyes of the Prussians were at once opened, and war, however hazardous, was determined on and was declared on 8 October, the emperor being already at Bamberg directing the movements of his troops, who had remained in Germany. On the 14th Napoleon met the enemy at Jena, and inflicted on them a severe defeat; while his general, Davout, added on the same day to the French triumph by the brilliant victory of Auerstädt. On the 27th Napoleon entered the Prussian capital. After garrisoning all the important fortresses and reducing such towns as made a show of resistance, he issued the celebrated Berlin decree (see CONTINENTAL SYSTEM), directed against English commerce. This policy nearly ruined the commerce of France and the other European nations, while it increased the prosperity of England. Her fleets and cruisers swept the seas; nothing could be obtained from the colonies save through her, and the continental merchants engaged in an extensive smuggling trade with the British, which it was impossible to prevent.

After the capture of Berlin Napoleon marched north against the Russians, who were advancing to assist the Prussians. He called on the Poles to rise, but was answered with little enthusiasm. At Pultusk 28 Dec. 1806, and at Eylau 8 Feb. 1807 he met with severe checks, and retired on the line of the Vistula; in the course of a few months, however, having received heavy reinforcements, he once more took the offensive. On 14 June was fought the battle of Friedland, which was so disastrous to the Russian arms that Alexander was compelled to sue for an armistice. The Peace of Tilsit was concluded 7–9 July, and by it the king of Prussia received back half of his dominions, and Russia undertook to close her ports against British vessels. The duchy of Warsaw was erected into a kingdom and given to the king of Saxony; out of the Prussian territories west of the Elbe the kingdom of Westphalia was formed and bestowed on Jerome, Napoleon's youngest brother; and Russia obtained a part of Prussian Poland, and by secret articles was allowed to take Finland from Sweden. Soon after the Peace of Tilsit was signed Napoleon entered into a war against Portugal, as that nation had refused to respect the Berlin decree, and Junot was sent to occupy Lisbon (30 Nov. 1807). The Pope refusing to carry out the continental blockade and to recognize Joseph Bonaparte as king of Naples, Rome was occupied 2 Feb. 1808. The administrative affairs of Spain having fallen into inextricable confusion, Napoleon sent into that kingdom an army under Murat, who with difficulty took possession of the capital and by the treaty of Bayonne Charles IV. resigned the Spanish crown, which was given to Joseph Bonaparte, Murat receiving the vacant sovereignty of Naples.

The great body of the Spanish people rose against this summary disposal of the national crown, and England assisted them with immense supplies. Thus began the Peninsular war (q.v.), which lasted seven years. The Spaniards were at first successful; a French squadron was captured by the English at Cadiz, 14 June; Gen. Dupont surrendered at Baylen, 22 July, with 18,000 men; Junot was defeated 21 August by Sir Arthur Wellesley at Vimeira. But Napoleon rushed to the scene of action in October at the head of 180,000 men, and entered Madrid in spite of all resistance by the Spaniards, 2 December. The British troops which had advanced to the aid of the Spaniards were driven back on Coruña, where they made a successful stand, but lost their general, Sir John Moore, 16 Jan. 1809. In the meantime Austria, alarmed at the aggressive policy of Napoleon, who had seized Tuscany and the States of the Church, and determined to profit by his absence in Spain, again declared war, and got together an effective army under the Archduke Charles. Napoleon hurried into Bavaria, encountered the archduke at Eckmühl (22 April), and completely defeated him; on 13 May he again entered Vienna. Reorganizing his shattered army, Charles likewise advanced toward Vienna on the opposite bank of the Danube. The French seized the island of Lobau, threw a bridge across the river, and attacked the enemy at Aspern and Essling on the 21st and 22d, but were repulsed and thrown back on the island, which they proceeded to fortify, awaiting the arrival of Eugène with the army of Italy. On 5 July they debouched on the left bank of the Danube, and on the 6th the Austrians were crushed at Wagram. This enabled Napoleon to dictate his own terms of peace, which were agreed to on 14 October at Schönbrunn. On the preceding day an unsuccessful attempt was made to assassinate him by a young German enthusiast named Staaps. Whether the subsequent marriage with the daughter of the Austrian emperor was in course of negotiation at Schönbrunn is doubtful, but soon after his return to Paris Napoleon informed Josephine of his determination to divorce her. He seems to have arrived at the conclusion that he could only put an end to the machinations of the old legitimate dynasties by intermarriage. Josephine, too, had borne him no children, and he was ambitious of perpetuating his power in his family. On 16 December an act of divorce was passed by the commissioners of the senate, and by proxy 11 March (formally 2 April) 1810 he was married to the Archduchess Maria Louisa. The fruit of this union was a son, Napoleon François Charles Joseph, born 23 March 1811, and proclaimed in his cradle king of Rome. (See REICHSTADT, DUKE OF.)

The years 1810–11 were the period of Napoleon's greatest power. On the north he had annexed Holland, Friesland, Oldenburg, Bremen,

and all the coast-line as far as Hamburg, and on the south Rome and the southern papal provinces. His empire thus extended from the frontiers of Denmark to those of Naples, with Paris, Rome, and Amsterdam as its first, second, and third capitals, and it was divided into 130 provinces, having a total population of 42,000,000. He may also be said to have exercised almost unlimited control in Spain, the Italian kingdoms, Switzerland, and the Confederation of the Rhine (q.v.). But now the tide began to turn. Russia found it impossible to carry out the continental blockade without permanent injury to her great landowners; Sweden, which had accepted Bernadotte, one of Napoleon's generals, as king, was in a like predicament. The Berlin decree was frequently evaded, which involved Russia particularly in fresh complications, and in view of the war now inevitable, that nation formed an alliance with Sweden. In May 1812 Napoleon declared war against Russia, and determined, in spite of the dissuasion of his most prudent generals, to invade the country. On 16 May Napoleon was in Dresden making arrangements for the great Russian campaign. The army he organized for it has been estimated at from 640,000 to 680,000 men, inclusive of Prussian, Austrian, German, Polish, and Swiss auxiliaries. An army of 300,000 Russians, under Barclay de Tolly and Bagration, assembled on the banks of the Niemen to oppose him. On 24 June he crossed that river at Kovno, and the Russians retired step by step before him, deliberately wasting the country, carrying off all supplies, and avoiding as far as possible general engagements. The French, however, pushed rapidly forward, overtook and routed the rear guard of Barclay's army at Ostrovno, 25 July, and on the 28th occupied Vitebsk. On 16 August the Russians made a stand at Smolensk against an advanced division of the French army, and when the latter entered the city on the 18th it was in ruins.

Both the opposing armies now took up their march toward Moscow. Kutusoff, who had succeeded Barclay, resolved to dispute the passage of the Borodino. An obstinate battle ensued 7 September, which cost the French nearly 30,000 men, and their opponents about double that number. On the 15th Napoleon entered Moscow, which had been deserted by its inhabitants, and which was nearly destroyed by a fire that began on the same night and lasted five days. The baffled French were compelled to seek shelter in the desolate surrounding country. Napoleon vainly attempted to negotiate with Alexander; it was impossible to pursue the Russians farther; nothing remained but retreat. The French army was now reduced below 120,000 men. For some time the weather was favorable, but the winter set in earlier than usual, and with extraordinary severity.

The line of retreat, too, led through the very districts which had been wasted on the advance. Swarms of mounted Cossacks incessantly harassed the French, now sadly demoralized by cold, famine, disease, and fatigue. When the invaders left Smolensk (14 November) they numbered only 40,000 fighting men, and when they had fought their way over the Berezina (27th) there remained but 25,000. At Smorgoni Napoleon quitted the army (5 December), leaving Murat in command.

Napoleon reached his capital on the 18th and immediately ordered a fresh conscription, still determined on prosecuting the war. But the spirit of Europe was now fairly roused; kings, ecclesiastics, and people rose unanimously against the devastator of the Continent, the terror of whose name had been destroyed by his disastrous reverse. A sixth coalition, consisting of Prussia, Russia, England, Sweden, and Spain was formed, which early in 1813 sent its forces toward the Elbe. Napoleon had still an army of 350,000 in Germany. For some months he was everywhere victorious. On 2 May he defeated the allies at Lützen, and on the 21st at Bautzen. He reached Breslau 1 June, and on the 4th concluded a six weeks' armistice, which gave the allies time to reorganize and concentrate their forces and, what was of equal consequence, to gain over Austria. The campaign was reopened 16 August. The allies advanced on Dresden, where Napoleon had his headquarters. The battle which ensued (see DRESDEN, BATTLE OF) 26-7 August was another dearly bought victory for the French, who were now so outnumbered that their chief was compelled to fall back on Leipsic. There he was completely hemmed in, and in the great "Battle of the Nations" (Völkerschlacht), as this battle of Leipsic is called, fought 16–19 October, he was completely defeated. The retreat across the Rhine was almost as disastrous as that from Moscow.

On Napoleon's arrival at Paris, 9 November, he succeeded in obtaining from the senate, in spite of the opposition in the legislative body and the prevalent discontent of the people, a decree for a conscription of 300,000 men. With a fertility of resource and a genius for combination almost miraculous, he was able to enter on another campaign, which was this time to be conducted in France. From January to March he confronted the combined hosts of the allies, inflicting defeat after defeat on them. But numbers were against him; a new and formidable enemy, Wellington, was rapidly advancing on the capital from the south. On 30 March the allies, after a severe engagement, captured the fortifications of Paris, and on the 31st Alexander and Wellington entered the city amid the acclamations of the people.

On 6 April Napoleon abdicated at Fontainebleau in favor of his son. He was allowed the sovereignty of the island of Elba, with the title of emperor, and a revenue of 6,000,000 francs. After bidding his army adieu he departed for his new abode, landing from the British frigate. Undaunted at Ferrajo 4 May, and Louis XVIII. was restored. After a residence of ten months, most of which was spent in intriguing with the Republicans and his own adherents, he made his escape from the island, and landed at Fréjus 1 March 1815, with an escort of 1,000 of his old guard. As soon as his arrival was known Ney and a large part of the army joined him, and he made a triumphal march on Paris, which he reached on the 20th. Louis was driven from his throne without a shot having been fired. The allies were startled at the astounding event. Their armies once more marched toward the French frontier. Napoleon, hastily reorganizing the government on a rather more liberal basis than that of the empire, and having made vain attempts to open negotiations for peace, advanced to meet them. On 15 June he crossed the Sambre at the head of 130,000 men to attack the

English and Prussians under Wellington and Blücher. On the 16th he defeated Blücher at Ligny, while at Quatre-Bras the English were held in check by Ney. The Prussians made an orderly and leisurely retreat, pursued by a division of the French army under Grouchy.

In order to preserve his communication with the Prussians, Wellington fell back upon Waterloo, where he was attacked by Napoleon on the 18th. The British held their ground obstinately during the greater part of the day, and in the evening, when Blücher, who had outmaneuvered Grouchy, came up, the French were completely crushed, and Napoleon's power forever broken. The retreat was a disorderly flight. The allies marched without opposition on Paris. On the 22d Napoleon again abdicated in favor of his son; but being threatened by Fouché, who had assumed the direction of the government, and seeing no hope of escape from France, he surrendered at Rochefort to Captain Maitland of the British warship Bellerophon, claiming the hospitality and protection of the British government. Captain Maitland was instructed to detain him as a prisoner, and then transfer him to the Northumberland, which was to convey him to the island of St. Helena, where he was to be confined for the rest of his life, according to a convention signed at Paris 20 August, between Great Britain, Austria, Russia, and Prussia. He landed there 16 October. In July 1816 Sir Hudson Lowe was sent out as governor of the island. From the very first Napoleon seems to have quarreled with that officer, and he appealed to the sympathy of the world through reports of the ill treatment he was subjected to. The governor had no power to remedy the chief causes of the prisoner's complaint. In September 1818 Napoleon's health began to fail. He refused medicine, would not ride, toward the end of 1820 grew worse, and died at last of cancer of the stomach. On 8 May 1821 he was buried on the island; but in 1840, in accordance with his own wishes, his remains were removed to Paris, and there, under the dome of the Hôtel des Invalides, they found their final resting-place. Consult: Thiers, 'History of the French Revolution' (1823–7) and 'History of the Consulate and Empire' (1845–61); Scott, 'Life of Napoleon' (1827); Bignon, 'Histoire de France sous Napoléon' (1829–50); Thibaudeau, 'Le Consulat et l'Empire' (1834–5); Lanfrey, 'History of Napoleon' (1869–75); Jung, 'Bonaparte et son Temps' (1880–1); Ropes, 'The First Napoleon' (1885) and 'Campaign of Waterloo' (1893); Fournier, 'Napoleon I., eine Biographie' (1886–9); Sargent, 'Napoleon Bonaparte's First Campaign' (1894) and 'Campaign of Marengo' (1897). For the relations of Napoleon with the United States, Adams' 'History of the United States 1801–17' (1889–91) should be consulted. The 'Correspondance de l'Empereur Napoléon I.' (1858–70) is a main source of original documentary history. Of works of a more personal character, dealing with the life of Napoleon from various points of view, among the more important are those of Bourrienne, Talleyrand, Metternich, Rémusat, Marbot, Montholon, Pasquier, Ségur, Las Casas, O'Meara, Sachet, Masséna, Marmont, and Roederer. As recent writings of another sort bearing on Napoleon's personal history, those of Levy and Masson deserve particular notice. The work of Rose, 'Life of Napoleon I.' (1901) is the latest complete biography in English. Channing's essay on Napoleon, and Emerson's chapter in 'Representative Men,' as well as Carlyle's pictures in 'Heroes,' are still worthy of attention.

Napoleon II., son of Napoleon I. See REICHSTADT, DUKE OF.

Napoleon III. (CHARLES LOUIS NAPOLEON BONAPARTE), emperor of the French: b. Paris 20 April 1808; d. Chiselhurst, England, 9 Jan. 1873. He was the son of Louis Bonaparte (q.v.), king of Holland. He was taken by his mother, Queen Hortense, to Switzerland in 1816, was educated at the gymnasium of Augsburg and the military school at Thun, joined the unsuccessful Italian revolt against papal rule in Romagna, and by a conspiracy at Strasburg on 30 Oct. 1836 was declared emperor. He was arrested and sent without trial to the United States, returned to Switzerland in 1837, lived in London in 1838–40, and on 6 Aug. 1840 landed at Boulogne for a fresh attempt against Louis Philippe. This time he was imprisoned in the fortress of Ham, under a life sentence; but he contrived his escape 25 May 1846. During this time he had leisure for the exercise of his literary abilities, and the result was the works: 'Aux Mânes de l'Empereur'; 'Fragments Historiques'; 'Analyse de la Question des Sucres'; 'Réponse à M. de Lamartine'; 'Extinction du Paupérisme'; besides contributions to the 'Dictionnaire de la Conversation,' and several articles to democratic newspapers. On the outbreak of the revolution of 1848 he hastened from England to Paris, and in a letter to the provisional government declared that he came to serve under the republican flag (28 Feb. 1848). On the day following he issued another letter announcing that as the government deemed his presence in Paris dangerous he would immediately quit the country. He accordingly returned to London, where he served as a special constable on the occasion of the great Chartist demonstration of April (1848). In the election of September he was put forward by Paris and three other departments. He returned to Paris and on 26 September took his seat.

He at once commenced through his zealous associates his candidature for the presidency. On the day of the election, 10 December, it was found that out of 7,500,000 votes Louis Napoleon had obtained 5,434,226. On the 20th the prince-president, as he was now called, took the oath of allegiance to the republic. For a time the greatest harmony seemed to be re-established; the president selected his ministers from the ranks of the various political parties, and strove to gain a majority in the assembly by the adoption of a strictly conservative policy. On 2 Dec. 1849 was formed a new ministry, the members of which were merely tools of the president. It was evident that a crisis was approaching. At last on 2 Dec. 1851 it came. Paris was overawed by the army; there was needless butchery in the streets; reports of approval by Paris of this course were sent to the provinces. The empire was re-established in Louis Napoleon by a vote of 8,000,000 to 640,000. On 29 Jan. 1853 the new sovereign married Eugénie Marie de Montijo, Countess de Teba. In 1854, Napoleon, in conjunction with England, entered the Crimean war in the interest of Turkey against Russia — a war which was carried on by all

the parties with great vigor, until a peace was concluded, 30 March 1856, the terms of which were the neutralization of the Black Sea, the abandonment by Russia of her protectorate of the Danubian principalities, and a re-arrangement of frontier territory between Russia and Turkey, to the advantage of the latter power. (See CRIMEA, *History.*) About the beginning of the year 1859 it was evident that another European war was imminent. Northern Italy was groaning under the Austrian yoke; Sardinia demanded a separate government for Lombardy and Venetia, which Austria refused to grant. War was declared between that country and Sardinia about the end of April, and Napoleon took up arms in favor of his Italian ally, Victor Emmanuel. The two allied sovereigns took the field in person. Montebello, Magenta, Marignano, and Solferino were brilliant victories for the allies. By the terms of the Peace of Villafranca, Austria ceded Lombardy to Italy, and the provinces of Savoy and Nice were given to France.

A second distant expedition was undertaken, but had not a like success. Toward the end of 1861 France, England, and Spain agreed to despatch a joint expedition to Mexico for the purpose of exacting redress of injuries of long continuance inflicted on the subjects of the respective allies, and the enforcement of pecuniary claims, which were obstinately contested by the Mexican government. The extravagant demands of M. de Soligny induced the English and Spaniards to believe that Napoleon had some ulterior object in view, and they withdrew from further intervention (April 1862). The French army continued the quarrel alone. On 10 June General Bazaine led his troops into the Mexican capital amid many demonstrations of enthusiasm. An imperial form of government was initiated, and Maximilian (q.v.), archduke of Austria, was placed at its head with the title of emperor. Maximilian's death caused Napoleon's policy to be viewed with suspicion in France. The emperor opened the Suez Canal, entertained Europe at the World's Exposition, rebuilt and greatly beautified Paris. But France lost slowly in prestige, and there was a decline of administrative integrity.

On the conclusion of the Austro-Prussian war of 1866 Napoleon, jealous of the growing power of Prussia, demanded a reconstruction of frontier, claiming, by way of compensation for his non-intervention in the quarrel, Prussian territory on the Saar, a claim peremptorily refused. The ill-feeling between the two nations was increased in 1867, when the king of Holland signified his intention to cede Luxemburg to France. The cession was strongly resisted by Prussia, and at the London conference (7–11 May) the neutralization of the duchy was agreed to by treaty under the guarantee of the Great Powers. It could no longer be concealed, however, that a rupture between France and Prussia was imminent, and in 1870, on the Spanish crown being offered to Leopold of Hohenzollern, Napoleon demanded that the king of Prussia should compel that prince to refuse it. Notwithstanding the subsequent renunciation of the crown by Leopold war was declared by France (19 July). (See FRANCO-GERMAN WAR.) On the 28th Napoleon set out to take the chief command. After Sedan, he had a personal interview with King William, who assigned to him Wilhelmshöhe, near Cassel, as a place of residence during his captivity. One of the immediate consequences of this disaster was a revolution in Paris. Gambetta, Jules Favre, and several other members of the Corps Législatif, proclaimed a republic and the dethronement of the emperor (4 September). The empress and her son secretly quitted Paris and repaired to England, where they took up their residence at Camden House, Chiselhurst. Here they were rejoined by the emperor, when he regained his freedom in March 1871, and here he remained till his death.

Napoleon III. was rather a student and littérateur than a statesman. He was not an efficient administrator, and was most unfortunate in his advisers and subordinates. At the time of the Franco-German war he appears to have been quite deceived as to the military strength of France and its readiness for the conflict. Besides the literary works already mentioned, Napoleon III. is the author of an uncompleted 'History of Julius Cæsar' (1865–6), and various productions collected and published in 1854–69 and 1873. Consult: Gottschalk (1871); von Sybel (1873); and Jerrold (1877) for biography; also Hugo, 'Histoire d'un Crime' (1877), and various standard histories of modern Europe.

Napoleon, Eugène Louis Jean Joseph, ė-zhăn loo-ē zhŏn zhō-zĕf, Prince Imperial of France: b. in the Tuileries, Paris, France, 16 March 1856; d. South Africa 1 June 1879. He fought for the Imperial arms in the Franco-German war of 1870–1; but when disaster seemed imminent was sent to join his mother in England, whither she had fled. He was proclaimed Napoleon IV. by his adherents in 1874. In 1879 he joined a British expedition against the Zulus in South Africa and was killed in ambush.

Napoleon, Joseph Charles Paul, PRINCE, a son of Jerome Bonaparte. See BONAPARTE, JEROME.

Napoleon, Ohio, village, county-seat of Henry County; on the Maumee River and the Miami & Erie Canal, and on the Lima Northern and the Wabash & Detroit R.R.'s; about 38 miles southwest of Toledo. Its chief manufactures are flour and dairy products. It has considerable trade in farm and dairy products and live-stock. The village owns and operates the electric-light plant and the waterworks. Pop. (1890) 2,764; (1900) 3,639.

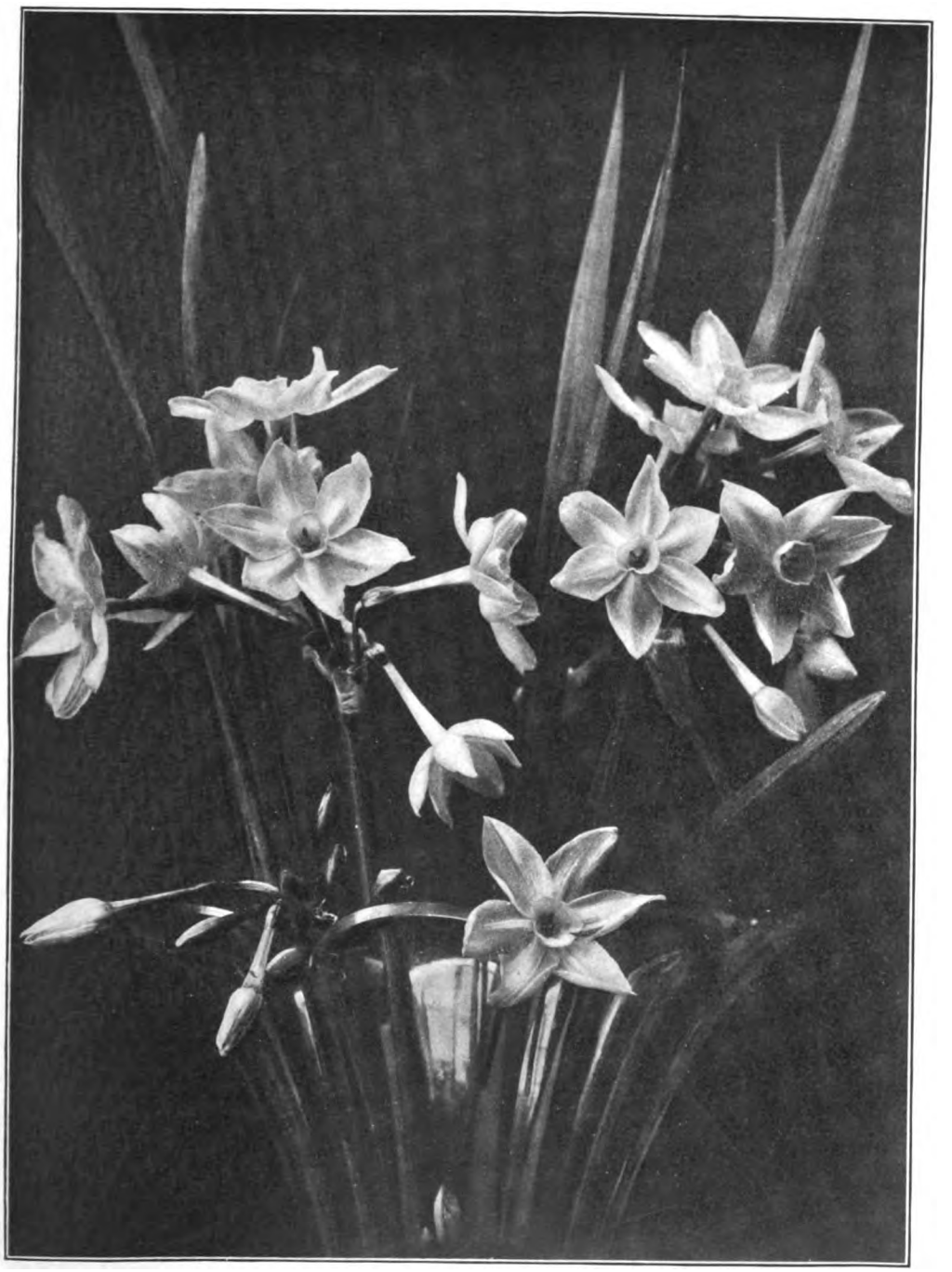
Napoleon, a piece of French money valued at $4 or 20 francs. See LOUIS D'OR.

Napoleon Gun. See ARTILLERY.

Napoleon le Petit, lė pė-tē ("Napoleon the Little"), the title of Victor Hugo's savage satire on Louis Napoleon (Brussels, 1852).

Napoleon's Tomb, the burial-place of Napoleon Bonaparte under the dome of the Invalides in Paris. It has the form of a circular crypt 20 feet deep and 36 in diameter, open at the top. The tomb was designed by Visconti, and on the walls are 10 marble reliefs by Simart. Napoleon's remains were brought here in 1840 from Saint Helena.

Naquatez (nä'kwä-tĕz) **Indians.** See CREEKS.



NARCISSUS.

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Naquinoneis, nä-kwē-nō'nēz. See CHIQUITOS.

Nara, nä'rä, Japan, the capital of a prefecture, and from 709–784 the capital of the country, on the island of Hondo, 26 miles by rail southeast of Osaka. It has some manufactures of toys, fans, art objects, etc., but its chief interest is archæological and historical, illustrated in the Shoso-in Museum with its splendid collection of antiquities, and in the shrines and temples dating from the imperial period, one of which contains a celebrated Daibutsu (q.v.), or gigantic statue of Buddha. Pop. (1898) 30,600.

Nar'aka, or **Nuruk,** in Hindu mythology, a term equivalent to the English word hell. In Naraka there are 28 divisions, in which sinners of as many different classes are confined and subjected to tortures corresponding to the gravity of their offenses.

Narbada, när-bä'dä. See NERBUDDA.

Narbonne, när-bŏn, France, the chief town of an arrondissement in the department of Aude, in a beautiful hill-girt plain, eight miles from the Mediterranean and 36 miles by rail east of Carcassonne. Boulevards occupy the site of the mediæval ramparts removed since 1865. The town, traversed by the Robine Canal, has dark and winding streets lined with ill-built houses, and is generally unattractive. It is, however, of historical interest as the Roman Narbo Martius, their earliest colony (118 B.C.) beyond the Alps. It flourished under Tiberius, its schools for a long time rivaling those of Rome. About 309 A.D. it became the capital of Gallia Narbonensis, and had its capitol, forum, theatre, aqueducts, triumphal arches, etc., of which there are few remains owing to the vandalism of Francis I. in using them as building materials. In 412 it was taken by the Visigoths, in 719 by the Saracens, from whom it was recovered by Pepin in 759, to fall a century later to the Northmen. During the 11th and 12th centuries it was a prosperous manufacturing city, but subsequently deteriorated owing to the silting of its harbor. The principal edifices are the Romanesque church of St. Paul (1229); the quondam cathedral of St. Just (1272–1332), only the fine Gothic choir of which, 131 feet high, has been completed; and the former archbishop's palace, now the city hall, in which are a good museum, a library, and a picture gallery. The white heather honey of Narbonne maintains its ancient celebrity; the wine is chiefly used for blending purposes, its production being now carefully supervised by the œnological station founded in 1894. Pop. (1901) 28,900.

Narcissus, när-sĭs'ŭs, in Greek mythology, the son of the river god Cephissus. Narcissus was of surpassing beauty, but excessively vain and inaccessible to the feeling of love. Echo pined away to a mere voice because her love for him found no return. Nemesis determined to punish him for his coldness of heart, and caused him to drink at a certain fountain, wherein he saw his own image, and was seized with a passion for himself of which he pined away. The gods transformed him into the flower which still bears his name. See ECHO; MYTHOLOGY.

Narcissus, a genus of plants of the order *Amaryllidaceæ* (q.v.). The species, numbering from 16 to about 50, according to different authors, have bulbous roots, narrow grass-like leaves, and generally white or yellow flowers borne singly or in small clusters and protruding from a dry spathe at the summit of a leafless scape. Because of their hardiness, ease of cultivation, habit of blooming in early spring, beauty and fragrance, many of the species and their numerous hybrids and varieties have been general garden favorites for centuries. A few produce their blossoms in the autumn (for example, *N. serotinus, N. elegans,* and *N. viridiflorus*); but they are rarely cultivated. Some are useful for winter forcing, especially the polyanthus narcissus (*N. tazetta*), with its popular forms the "paper white" and the "Chinese sacred lily." In general, the garden species succeed best in well drained garden soil of medium texture and richness. The bulbs should be planted in autumn about five inches deep and three inches apart, and should not be disturbed until they appear to be failing, perhaps after three years. Then when the foliage has died down the clumps may be dug, the bulbs divided, cleaned, and stored in a cool dry place until planting time. Among the most popular species are the poet's narcissus (*N. poeticus*), also known as pheasant's eye, the jonquil (*N. jonquilla*), and *N. tazetta* mentioned above. The Lent lily (*N. pseudo-narcissus*), or daffodil, is also one of the most widespread and hardy. See DAFFODIL.

Narco'sis, or **Narcotism** (Greek, "stupor"), insensibility more or less profound, the result of absorption by the blood, and subsequent action on the brain, of certain drugs in poisonous amount, or of certain excretory elements, as in uræmia.

Narcot'ics (from Greek ναρκοῦν, to benumb), substances which have the property of stupefying. In small (medicinal) doses they either quiet undue irritability of the nervous system, producing sleep and relieving pain or spasm, or they excite or stimulate the normal irritability. Opium and alcohol, for example, are sometimes used as "bracers." Narcotics are too frequently used for slight ailments or fancied ones. For the repeated or habitual use of small doses is dangerous, as it is apt to excite a craving for and the use of larger or poisonous doses (see POISONS). Poisonous doses produce stupor, coma, and sometimes convulsions and death. Those narcotics which produce sleep are termed hypnotics (q.v.) or soporifics. Those which are used to alleviate pain are anodynes or analgesics (q.v.). Though the effects of most of the narcotics resemble more or less those of opium each narcotic affects the system in a peculiar way. Belladonna, for example, dries the throat, dims the vision, dilates the pupils of the eyes (opium contracts them), and produces delirium. Some narcotics produce constipation, others do not. Some act principally upon the brain, others on the alimentary canal or bronchial tubes. The principal narcotics are opium (with its alkaloids, such as morphia, codeine, and thebaia, and preparations of it — paregoric, laudanum, etc.), belladonna, camphor, hyoscyamus or henbane, caffeine, chloral hydrate, alcohol, Indian hemp, hops, bromide of potassium, and stramonium. There is also a group of chemical organic compounds which are narcotics, such as paraldehyde, sulphonal, and trional. Nar-

cotics should be used with extreme caution, as the susceptibility to their poisonous effects varies in different persons. Of late years the market has been flooded with so-called pain-cures, carminatives, cordials, soothing-syrups, etc., warranted to be harmless, but which are in fact narcotics, in mixtures more or less agreeable to the taste, but none the less liable to do harm. Children are more susceptible to the influence of narcotics tnan adults, hence the risk of giving them to children is greater. See ANÆSTHETICS: NICOTINE: TOBACCO.

Nar'cotine, an alkaloid which occurs in opium, has the chemical formula $C_{22}H_{23}NO_7$, and acts as a narcotic poison. It may be prepared as follows: Opium is exhausted with dilute hydrochloric acid, and the alkaloidal bases that the extract contains are precipitated by the addition of caustic potash. The precipitated bases are then re-dissolved, and the solution is treated with oxalic acid to precipitate the papaverine that it contains, after which the filtered solution is treated with ammonia to throw down the narcotine. The precipitate so obatined is purified by re-crystallization from alcohol. Narcotine was the first alkaloid obtained from opium, of which it constitutes from 1 to 8 per cent by weight. It is almost insoluble in cold water, moderately soluble in alcohol and in ether, and readily soluble in chloroform. It crystallizes in trimetric prisms, or in radiating needle-like forms, which melt at 349° F. Aqueous solutions of the alkaloid are neutral, and solutions in other menstrua are but feebly alkaline. Narcotine (unlike the other alkaloids that opium contains) appears to exist in opium in the free state, and not in the form of a salt. Its salts do not crystallize readily, and are decomposed when their solutions are evaporated, with separation of free narcotine.

Nard, a plant, spikenard. See ARALIA.

Nares, närz, SIR **George Strong,** English Arctic explorer: b. Danestown, near Aberdeen, Scotland, 1831. He was educated at the Royal Naval College and entered the navy in 1845. He accompanied the Arctic expedition of 1852–4 and in 1872–4 commanded the Challenger. In 1875–6 he was at the head of the North Polar Expedition and obtained valuable scientific information, after which he was assigned to the command of a survey of the South Pacific. He was created vice-admiral in 1892, but has retired from active service. He wrote: 'Seamanship' (1862); 'Voyage to the Polar Sea' (1878); etc.

Narghile, när'gĭ-lē, or **Nargileh,** a Turkish tobacco-pipe, the chief feature of which is that when used the smoke is made to pass through water. It is otherwise called a hookah, and is commonly known as a water-pipe.

Nariño, nä-rē'ño, **Antonio,** Colombian politician: b. Bogota, Colombia, 1765; d. Leiva, Colombia, 13 Dec. 1823. He was educated in the college of San Bartolome in Bogota and entered the magistracy. His writings of a revolutionary character brought him into trouble and in 1795 after a tedious trial he was transported to Spain under sentence of ten years' penal servitude. Escaping in 1797 he returned to his own country but was again imprisoned and not released until the revolution of 1810, when he joined the patriot army. He was elected president in 1811 and later dictator. Civil war breaking out Nariño defeated the federalists and then resigning his dictatorship marched against the royalist forces in the south. His success was followed by defeat at Pasto in 1814 when he was captured and sent a prisoner to Spain. He was held a prisoner until 1820 when he returned to his own country. In 1821 he was elected senator, but declined the vice-presidency in 1822 and ill health compelled him to retire soon after his appointment as commander-in-chief in 1823.

Narragansett (năr-ą-găn'sĕt) **Indians,** an American tribe formerly occupying the territory now comprised in the State of Rhode Island and the eastern part of Long Island. Shortly after the arrival of the pilgrims they manifested symptoms of hostility; and as an expression of sentiment Canonicus, their chief, sent to Plymouth a bundle of arrows wrapped in the skin of a rattlesnake; to which Bradford, the governor, replied with the same skin filled with powder and shot. This significant retort secured, if not the good-will, at least the peaceableness of the sagacious chief. In the Pequot war they aided the colonists, but not unanimously. In the winter of 1675, during King Philip's war, that chief having taken refuge with the tribe, the colonists, apprehending that they would join his cause, made a secret attack upon their principal fort, killing about 1,000 warriors, destroying all their provisions, and exposing those who escaped to cold and famine, of which very many died. The Narragansetts from this time waged incessant war with the whites. They have now entirely disappeared as a race, although some of their descendants of mixed blood are to be found in one or two localities in Rhode Island.

Narragan'sett Bay, an inlet of the Atlantic Ocean, extending into the State of Rhode Island about 28 miles. At its entrance, from Sakonnet Point to Point Judith, the bay is about 18 miles wide. One of its channels, on the east, is called Sakonnet River, and the chief arms of the bay are on the east Mount Hope Bay, on the west, Greenwich Bay. The principal rivers which enter the bay are, at its head, Providence River, from the east Taunton, from the west Pawtuxet. The largest island in the bay is Rhode Island, and others are Conanicut, Prudence, and Hog. Several places of importance are on the shores of the bay, chief of which are Providence at the mouth of the Providence River, Newport on Rhode Island, and Fall River, at the mouth of the Taunton.

Narragansett Bay is of great importance to the State, as it gives a longer shore-line and more opportunities for commerce and transportation. The first explorers of the northeast coast of the United States mention this bay.

Narragansett Pier, R. I., a famous summer resort, in Washington County; on Narragansett Bay, and on the Narragansett Pier Railroad; about 10 miles from Newport and 28 miles from Providence. The railroad was built in 1876 and extends from Kingston Station to the "The Pier," a distance of about 12 miles. A steamer plies daily during the season between Newport and "The Pier." The chief attractions are the climate and the scenery. Narragansett Heights, about three miles distant, are about 400 feet above sea-level. The colored rocks nearby and

the long beach are attractive. There are a number of fine hotels, handsome cottages, and excellent bathing houses and pavilions. The place was settled in 1675, and the same year an engagement took place nearby between the colonists and the Narragansett Indians. Gen. Winslow, who commanded the colonists, about 1,000 in all, captured 600 Indians and killed 300. The loss of the whites was about 150 wounded and 85 killed. The pier, from which the place takes its name, was built in 1815. Pop. (1890) 1,408; (1900) 1,523.

Narrenschiff, när'ĕn-shĭf, **Das** ("The Ship of Fools"), Sebastian Brant's celebrated work (1494). See BRANT, SEBASTIAN.

Narrows, The, a narrow part of New York Bay, a channel which connects Upper New York Bay with Lower New York Bay, and separates Long Island and Staten Island. At the south entrance of The Narrows are two forts, Fort Hamilton on Long Island and Fort Wadsworth on Staten Island. See NEW YORK BAY.

Narses, när'sēz, Byzantine general: b. Armenia 472; d. Rome 568. He was a slave and a eunuch, when he entered the imperial household in Constantinople, of which he soon became chamberlain. His ability soon advanced him to the office of treasurer to Justinian, who sent him to Italy in 538 to keep an eye on Belisarius. In 551 Narses became commander-in-chief in Italy, speedily drove thence the Franks and Goths, re-established Byzantine control, but in spite of his able administration was removed by Justinian's successor, Justin II. Legend says that he was insulted by the Empress Sophia upon his dismissal, and that he thereupon went over to the Lombards. He was equally famous as general and statesman. Consult: Hodgkin, 'Italy and Her Invaders' (1885–95, Vols. IV. and V.); Bury, 'Later Roman Empire' (Vol. I., 1889).

Nar'thex (Greek, a reed, hence any oblong figure), the term used in ecclesiastical architecture to designate the westernmost division of an ancient Greek Church, running like a cloister from the north to the south wall. It was separated from the nave proper by a screen or railing, beyond which catechumens and those under Church censure or penance were not permitted to advance. It had th ee door-ways, one on the west as well as one in the northern and southern walls. The western was the principal entrance and was known as "the beautiful" or "royal gate." The doors leading through the screen into the nave were named according to the classes who used them, "the priests' gate," "the men's gate," etc. The narthex was also used for funerals and public meetings; baptism was celebrated there and the font, which had formerly been in a building adjoining the church, was also placed in the narthex. Consult: Bingham, 'Christian Antiquities'; Siegel, 'Christliche Alterthümer'; Walcott, 'Sacred Archæology.'

Naruszewicz, nä-roo-shä'vĭch, **Adam Stanislaw,** Polish historian and poet: b. Pinsk, Lithuania, 20 Oct. 1733; d. Janow, Galicia, 8 July 1796. He became a Jesuit in 1748; taught in the Jesuit schools in Wilna and Warsaw; and after the suppression of the Order became bishop of Smolensk, and later of Lutsk. His poetry, consisting of translations, odes, fables, epigrams, satires, and idylls, was published in 1778. In prose, he translated Tacitus, wrote a biography of Chodkiewicz (1781), composed a history of Crimea (1787), and on the suggestion of his patron, King Stanislaus Augustus Poniatowski, wrote his greatest work, a history of Poland down to 1386 (1780–6), which, because of its style and its protest against the abuses of a monarchy or an aristocracy, won him the name of the Polish Tacitus.

Narvacan, när-vä-kän', a pueblo of the province of Ilocos Sur, Luzon, situated 13 miles southeast of Vigan, the provincial capital. It is on the main road and one of the most important towns of the province, being next the capital in population. Pop. 16,500.

Narvaez, när-vä-ĕth', **Pánfilo de,** Spanish soldier in America: b. Valladolid about 1470; d. near mouth of Mississippi River November 1528. He came to America about 1498, settled first in Santo Domingo and then in Cuba, where from 1512 until his death he was under Velasquez in the command of an auxiliary force in the conquest of the island. The disobedience of Cortés in Mexico, whither he had been sent by Velasquez led the latter to send Narvaez in 1520 to supersede and punish Cortés. This expedition was entirely unsuccessful. Narvaez landed at Vera Cruz in April; was defeated in May at Cempoala by the army of Cortés; lost one eye in the battle; and was deserted by the remnant of his army, which joined Cortés. He was captured, but soon released; returned to Spain, where he was appointed governor of Florida in 1526; and sailing from Cuba in March of 1528, landed at Apalachee Bay, lost half his men on the march inland, retreated to the shore, where he found that his ships had been destroyed, and having built boats, sailed westward along the coast, only to be shipwrecked with all but four of his men.

Narvaez, Ramon Maria, DUKE OF VALENCIA, Spanish general and statesman: b. Loja, Andalusia, 4 Aug. 1800; d. Madrid 23 April 1868. He entered the army in 1815; lived in retirement from 1823 to 1834; in 1836 defeated the Carlist leader, Gomez; and in 1838, after clearing La Mancha of brigands, was made captain-general of Old Castile. He led an insurrection against Espartero, his old chief, but was beaten and fled to France, where he joined the party of Maria Christina. He returned to Madrid in July 1843; Espartero left the country; and from May 1844 to February 1846, and from October 1847 to January 1851 Narvaez was prime minister, in recognition of his services to Maria Christina. He held the same post in 1856–7 and 1864–5, being minister to Paris and Vienna in the intervals. During the military rising of 22 June 1866 Narvaez commanded the loyal soldiery, and in July succeeded the defeated O'Donnell as ministry president and minister of war. A liberal in early life he became more and more conservative and spent his last years in attempting to keep Isabella on the throne.

Nar'whal, a large porpoise which inhabits the Arctic Ocean. It belongs to the family *Delphinidæ* and was named *Monodon monoceros* by Linnæus. Its most striking characteristic is the possession of a very long, straight, spirally-grooved tusk, which projects forward from the left side of the upper jaw in line with

the axis of the body. When full-grown the narwhal has a length of about 16 feet. The head is rounded, the back has a very low ridge instead of a fin, and the pectoral fins are short and broad. The color of the body is gray above, and white below, everywhere mottled and spotted with gray and black. The young are darker colored, while old individuals are often nearly white throughout. The vertebral formula is as follows: Cervicals, 7; dorsals, 11; lumbars, 6; caudals, 26; total, 50. The cervical vertebræ, unlike those of other porpoises, except the beluga or white whale, are all free. The skull is depressed, with a broad rostrum.

The massive tusk or maxillary tooth of the narwhal is developed only in the male, and with rare exceptions, only on the left side of the jaw. Normally, the corresponding tusk or tooth of the right side remains concealed in the maxillary bone during life. In females neither tusk is visible. All other teeth are wanting in adults of both sexes. Occasionally, both tusks are developed in males and in females as well. About 16 such heads have been preserved, including one from Prince Regent Inlet in the National Museum, Washington. The largest narwhal tusks are about 8 feet long, with a girth of about 9 inches at the base. They are hollow for a considerable proportion of their length.

The tusk is a secondary sexual character like the antlers of the stag, the spurs and comb of the cock, etc. It has been suggested that the narwhal makes use of the tusk to break the ice, to transfix its prey, or in combat, but these ideas lack confirmation.

When first introduced into Europe, the true origin of the tusks not being known, they were supposed to be the horns of the mythical unicorn. For a considerable time they were highly prized on account of their reputed medicinal properties, and are still made use of in China as a drug.

Narwhals occur in large herds, or schools, among the ice of the Arctic Ocean, northward of lat. 65° N. They migrate to higher latitudes as the ice recedes and return in the fall. Very rarely individuals stray southward along the coast of Europe as far as Scotland.

The narwhal resembles the beluga or white whale in many important characters, not shared by other porpoises, and forms with it a separate sub-family, the *Delphinapterinæ*.

F. W. True,
Curator U. S. National Museum.

Nasals. See Phonetics; Speech.

Nasby, năz'bĭ, **Petroleum V.** See Locke, David Ross.

Nascent State, in chemistry, the state or the peculiar reactionary power possessed by an element at the instant of liberation from a compound or combination in which it has previously existed. At the moment an element is liberated from a compound of which it has been a constituent it acquires a higher power of chemical reaction than it displays some time after its liberation. One theory of the nascent state of an element is that the molecules at the instant of liberation are separate and independent; and that an appreciable length of time is required for their final arrangement; and that while they are in this free state, they possess an extraordinary power of reaction, which power is otherwise exerted and expended in the act of molecular arrangement. For instance, it has been advanced by some chemists and physicists that hydrogen in a nascent state is made up of single atoms, while hydrogen in a gaseous state is composed of molecules, each molecule containing two atoms. Thus many substances will combine with nascent hydrogen which utterly refuse gaseous hydrogen.

Nascopi, nä-skō'pē, or **Nascapee, Indians,** a Labrador tribe, the most easterly known branch of the Algonquian family. They formerly occupied the interior table-land extending from Lake Mistassini to the Atlantic Ocean.

Nase'berry, the fruit of *Sapota achras,* one of the finest West India fruits. The bark of the tree has astringent and febrifugal properties. See Sapotaceæ.

Naseby, nāz'bĭ, England, a village of Northamptonshire, 12 miles northwest of Northampton (pop. 700), near which, on 14 June 1645, Fairfax and Cromwell commanding the Parliamentary troops, defeated Charles I. and his army, taking 5,000 prisoners and capturing the royal cannon and baggage. Since 1823 the battlefield is marked by an obelisk on Naseby ridge (648 feet).

Nash, Abner, American politician: b. Prince Edward County, Va., 8 Aug. 1716; d. Philadelphia, Pa., 2 Dec. 1786. He studied law and removed to New Berne, N. C., where he practised successfully and in 1774 he was a member of the first provincial congress of North Carolina. He served as member of the council which framed the State constitution in 1776 and was speaker of the senate in 1779. He was governor of the State from 1779–81 and in 1782–6 sat in the Continental Congress.

Nash, Francis, American soldier: b. Prince Edward County, Va., 10 May 1720; d. Germantown, Pa., 7 Oct. 1777. He was a brother of Abner Nash (q.v.), and early removed to North Carolina where he was clerk of the superior court of Orange county. He served under the crown with a captain's commission but resigned and was a member of the provincial congress which met in 1775 when he was appointed lieutenant-colonel in the Continental army. In 1777 he was commissioned brigadier-general by the Continental Congress and at once joined Washington, under whom he commanded a brigade and was mortally wounded at the battle of Germantown.

Nash, George Kilbon, American politician: b. York Township, Medina County, Ohio, 14 Aug. 1842. He was educated at the Western Reserve University and at Oberlin College, studied law and was admitted to the bar. He was editor of the 'Ohio State Journal for over a year and in 1879–82 was prosecuting attorney of Franklin County, Ohio. He established a law practice in Columbus in 1883–5. In 1900 he was elected governor of Ohio, and in 1902 he was re-elected.

Nash, Henry Sylvester, American theologian: b. Ohio 1854. He entered the Protestant Episcopal ministry in 1881, and since 1884 has been professor of the literature and interpretation of the New Testament at the Episcopal Theological School, Cambridge, Mass. He has written: 'The Genesis of the Social Conscience' (1896); 'Ethics and Revelation' (1898); 'His-

tory of the Higher Criticism of the New Testament' (1900).

Nash, Sir **John,** English architect: b. London 1752; d. East Cowes Castle, Isle of Wight, 13 May 1835. He studied and practised architecture under Sir Robert Taylor; then retired from business until 1793; and upon his re-entry into the profession gained much royal and noble patronage. He laid out Regent's Park, and the street leading up to the Park, now called Regent Street; remodeled Buckingham Palace; and altered the Brighton Pavilion. He was particularly fond of single façades, of projecting colonnades, and of a plentiful use of plaster and stucco. The use of cast-iron girders was principally introduced by Nash, who patented several varieties. Personally he was an estimable man, but unpopular because of George IV.'s display of favoritism toward him.

Nash, Richard, called Beau Nash, English leader of fashion: b. Swansea, Wales, 18 Oct. 1674; d. 3 Feb. 1762. He studied at Jesus College, Oxford, was for a time in the army, but finding military discipline not to his liking, entered at the Inner Temple. In 1705 his skill in gaming took him to Bath, which in 1703 had become a much frequented watering-place. He determined to improve the provincial character of the spa, and soon became a self-appointed but arbitrary master of ceremonies. He was known as the "King of Bath" and his rule was celebrated in prose and verse. His code included the prohibition of swords within his realm, a restriction which tended toward that consideration for the public peace which was then growing in England. His vanity grew with his power; he appeared in a monstrous cream-colored beaver and invariably journeyed by post-chariot with three span of grays, footmen, and outriders. About 1758 he withdrew from a reign which seems to have been in its way skilful and judicious. Goldsmith wrote his life (1762).

Nash, or **Nashe, Thomas,** English satirist and dramatist: b. Lowestoft, Suffolk, 1567; d. 1601. He studied at Cambridge in 1586, spent some time on the Continent, and before 1588 came to London. In 1589 he published his 'Anatomie of Absurditie.' In the literary warfare carried on between the Puritans and bishops Nash took an active part in behalf of the latter. Under the pseudonym "Pasquil," he published the tracts, 'A Countercuffe Given to Martin Junior' (1589) and 'Pasquil's Apologie' (1590). In 1592 he issued his powerful satire on contemporary society, 'Pierce Pennilesse his Supplication to the Divell.' His 'Christes Teares over Jerusalem' (1593) followed in repentant mood, and he affected to dismiss satire, in which, he said, he had "prodigally conspired against good houres." His notable work of picaresque fiction, 'The Unfortunate Traveller, or the Life of Jack Wilton' (1594) to a certain extent anticipated Defoe. Involved in a paper war with Gabriel Harvey, who had boasted of having put him to silence, he thereupon published 'Have with you to Saffron-Walden, or Gabriel Harvey's Hunt is Up' (1596), brimming with scorn. Nash also wrote plays, in whole or in part. He completed, unsatisfactorily (1594) Marlowe's 'Dido.' His 'Summers' Last Will and Testament' (1593), comedy, was first published in 1600. A play 'The Isle of Dogs,' led to his imprisonment for attacks contained in it. He died having, as one epitaph put it, "never in his life paid shoemaker or tailor." Nash's personality was somewhat unique in Elizabethan literature. His prose was vigorous, and his verses were at times those of a poet. His works were edited by Grosart (1883–4).

Nashua, năsh'ū-a, N. H., city, one of the county-seats of Hillsboro County; on the Nashua River, and on several branches of the Boston & Maine railroad; about 33 miles south by east of Concord and 38 miles northwest of Boston. The first settlement was made in 1655 and in 1673 it was incorporated by Massachusetts as Dunstable township. In 1746 it was reincorporated by Massachusetts, and in 1836 it adopted the name Nashua. It received its city charter in 1853. It is an important manufacturing city; the water power is obtained from the Nashua River by means of a canal three miles long, 60 feet wide and eight feet deep. The chief manufactures are cotton goods, paper, shoes, iron and steel products, edge tools, hardware, saddlery, refrigerators, registers, sash, doors, and blinds, ice cream freezers, stationary engines, caskets, and furniture. It has a United States fish hatchery, city and county buildings, and several fine church buildings, Saint Francis Xavier (R. C.) is the largest. There are excellent public and parish schools, and two academies. The original charter of 1853, still in use, provides for a mayor, who holds office two years, and a council. The school board is chosen by popular vote. Pop. (1890) 19,311; (1900) 23,898.

Nashville, Ill., city, county-seat of Washington County; on the Illinois S. and the Louisville & N. R.R.'s; about 110 miles south by east of Springfield. It is in an agricultural region, in which there are large coal fields. The chief manufactures are flour, dairy products, and agricultural and mining implements. Coal mining and cattle raising contribute to the industrial wealth of the city. Pop. (1890) 2,084; (1900) 2,184.

Nashville, Tenn., capital of Tennessee, the second largest city in the State, and county-seat of Davidson County; 186 miles southwest of Louisville, Ky., and 234 miles northeast of Memphis. Nashville is on the Cumberland River, and the Nashville, C. & St. L., Louisville & N. and Tennessee C. R.R.'s.

Topography.— The city has an area of about 12 square miles and is regularly laid out on gradually rising ground, sloping back from the river to an elevation of 560 feet above the sea. The streets are wide and well paved, about 175 miles of thoroughfare being covered with macadam and about 20 miles paved with granite, brick and bitulithic pavement. Around the city in every direction are the green hills of Middle Tennessee where there is much commercial timber and mineral wealth. The soil in the vicinity produces every fruit and vegetable not absolutely confined to the tropics. The average rainfall for 31 years has been 48.82 inches; the average winter temperature 39 degrees; and summer temperature 79; mean temperature for the year 59.

Government.— Nashville is governed under a charter of 1883, revised in 1901, by a mayor elected every two years, and a unicameral coun-

cil, which confirms the mayor's nominations of Park Commissioners, Civil Service Commissioners, Members of the Board of Health and of the Board of Education. The city attorney, comptroller, treasurer, tax assessor, city judge and board of public works are elected by the people. The city expends annually $1,000,000 for maintenance; the principal items being $200,000 for schools; $167,000 for interest on debt; $95,000 for police department and $60,000 for waterworks. The waterworks are owned by the city; the system which comprises 85 miles of mains cost over $2,000,000. The electric lighting plant is also owned by the municipality. Over $1,000,000 has been expended in recent years on a new and improved sewer system. The street railways operate over 85 miles of track, all converging at a central transfer station.

Buildings.— Prominent among the noticeable structures are the State Capitol, costing $1,500,000; United States Government Building; Davidson County Court House; the City Hall; Tennessee School for the Blind; Tennessee Industrial School; the State Penitentiary; the Parthenon; City Hospital; Confederate Soldiers' Home; Vendome Theatre; the new Union Depot; and the various churches and educational institutions.

Education.— There is no city in the South as prominent in educational interests as Nashville. Here is the seat of the Vanderbilt University; the University of Nashville; Peabody School for Teachers; Medical and Dental Departments of the University of Tennessee, the rest of which is located at Knoxville; Ward Seminary; Belmont College; Boscobel College; Watkins Institute; St. Cecilia Academy; Fisk University; Roger Williams University; Walden University. The State Library contains 40,000 volumes. The Carnegie Library cost $100,000 and has a fine and rapidly increasing number of volumes. The Tennessee Historical Society has a large and valuable library, many rare manuscripts, portraits, etc. The public schools are of the highest rank, and embrace, in addition to the ordinary studies ranging into the high school education, departments of industrial education, stenography, typewriting, bookkeeping.

Parks and Cemeteries.— In the park surrounding the State Capitol building is the tomb of James K. Polk (q.v.) and an equestrian statue of Andrew Jackson. The Hermitage, the former home of Jackson, is 10 miles east of the city. To the north is the National Cemetery where are buried 16,643 soldiers who fell in the Civil War. A Centennial Park has been made on the grounds of the Tennessee Centennial Exposition of 1897, and the former history building is now a museum and art gallery. In the park is a fine monument honoring James Robertson, the founder of Nashville. Watkins Park is to the west. Shelby Park, to the east of the city, is a natural shaded tract with a river frontage. Glendale Park, to the south, is a place of unrivaled beauty. There is also here Mount Olivet Cemetery, with the beautiful Confederate soldiers' monument, and the Cumberland Driving Park.

Manufactures.— The industries of Nashville, which are more extensive than any other city in the State, have an aggregate capital of $13,173,000, with an annual output valued at $18,470,000. The manufactures include flour, grist-mill products, lumber and timber products, fertilizers, cotton goods, clothing, harness, saddlery, soap, stoves, ranges, hollow ware, coffins, shoes, candles, tobacco, wagons, carriages, and confectionery. There is a large export trade and extensive wholesale traffic in dry goods, boots and shoes, groceries and drugs. The wholesale trade in 1902 was estimated at over $60,000,000. Almost at the doors of Nashville, and tapped by every line of railroad entering the city, are apparently inexhaustible fields of coal of the highest grade. The bountifulness of the supply is attested by the fact that during the prolonged anthracite coal strike, when coal was selling at almost prohibitive prices in every other section of the country, there was absolutely no advance in the price of coal in Nashville.

History.— The city was settled in 1780 by a band of pioneers under the leadership of James Robertson. It was named in honor of Gov. Abner Nash of North Carolina and was called Nashborough until 1784. During the early years of its existence Nashville was repeatedly attacked by the Cherokees and other Indian tribes. It was chartered as a city in 1806; was the seat of the State legislature in 1812–15, and became the permanent State capital in 1843. The Federal army occupied the city in 1862 and around the city in 1864 was fought one of the great battles of the Civil War. (See NASHVILLE, BATTLE OF.) In 1896, the State celebrated the centennial of Tennessee's admittance into the Union, and a great industrial exposition was held here the following year.

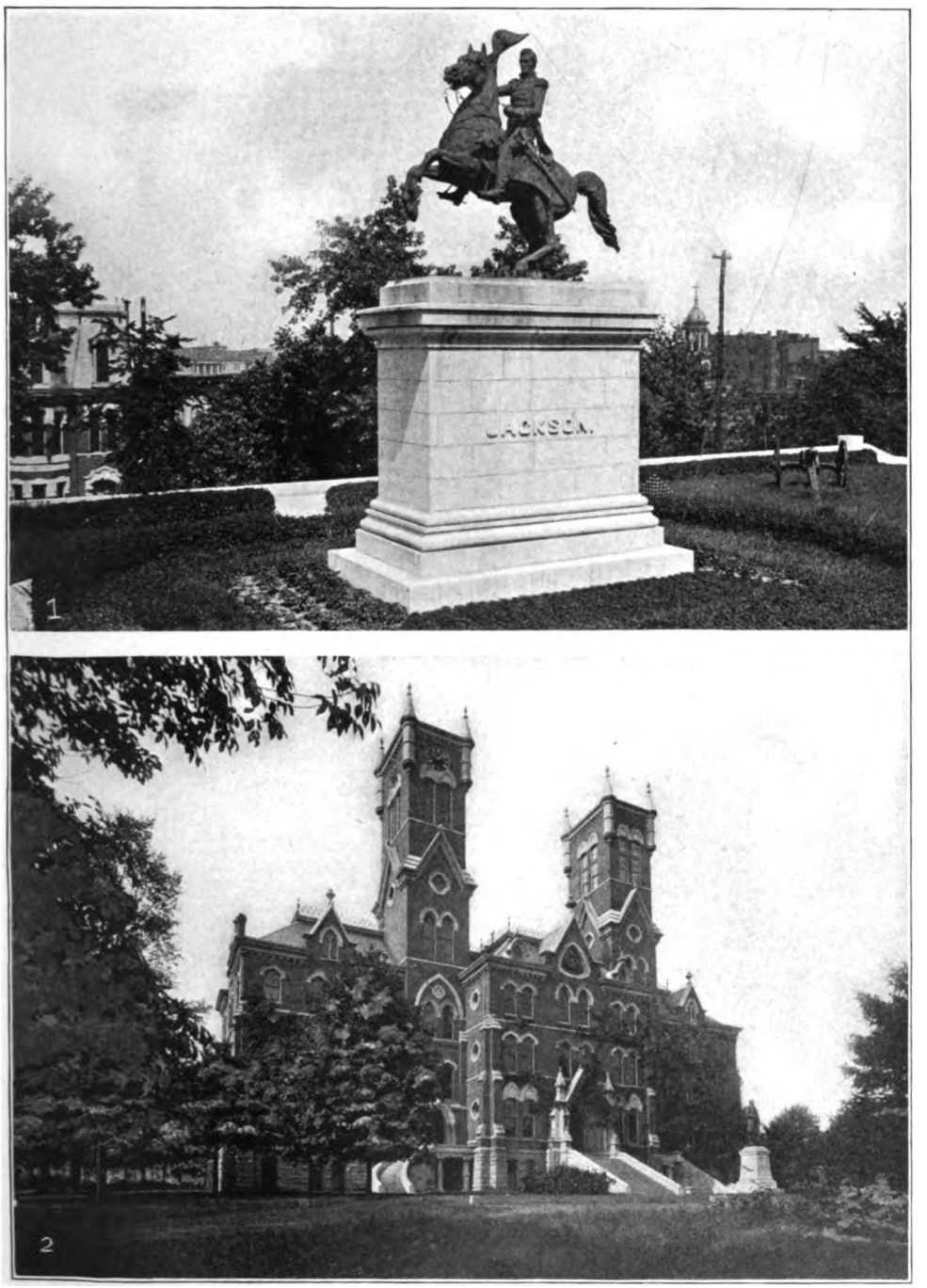
Population.— Nashville in 1830 had a population of 5,566; (1850) 10,165; (1860) 16,988; (1870) 25,865; (1880) 43,350; (1890) 76,168; (1900) 80,865; the last total includes 3,037 persons of foreign birth and 30,044 of negro descent.

R. A. HALLEY,
Retail Merchants Association, Nashville, Tenn.

Nash'ville, the name of a Confederate privateer that left Charleston in 1861 on a cruise to England and captured booty to the amount of $3,000,000. In March 1863 she was sunk by a Federal ironclad at the mouth of the Savannah River.

Nashville, Campaign and Battle of. When Gen. Sherman's picked army of 62,000 left Atlanta 15 Nov. 1864 for the March to the Sea (q.v.) the Confederate army under Hood, strengthened by Forrest's cavalry, was on the Tennessee River in the vicinity of Tuscumbia and Decatur, with S. D. Lee's corps across the river and in advance of Florence. Active preparations were making for a move on Nashville with the Ohio as a possible objective. Gen. Thomas had been sent to Nashville six weeks before to organize a force to resist Hood. Toward the last of October the Twenty-third corps, Schofield's, and the Fourth, D. S. Stanley's, were ordered to Thomas, who sent them under Gen. Schofield to Pulaski, with orders to delay Hood as long as possible to allow of the needed concentration and organization at Nashville. This infantry force at Pulaski aggregated 18,000 effectives, one division of the Twenty-third corps being detached, and was further strengthened by four brigades of cavalry under Gen. James H. Wilson. Forrest's force of Confederate cavalry was four times

NASHVILLE, TENN.



1. Jackson Monument.

2. Vanderbilt University, Science Hall.

Wilson's. Gen. Sherman thus describes the force with Gen. Thomas at Nashville at the time of Hood's advance on Pulaski: "Gen. Thomas was at Nashville with Wilson's dismounted cavalry, and a mass of new troops and quartermaster's employees amply sufficient to defend the place." Of the sound men sent back to Thomas by Gen. Sherman when he was fitting out a perfect army for the March to the Sea, he lost 15,000 from expiration of service, or from furloughs previously granted, within a week after Hood's advance from Florence. In place of these 15,000 Thomas received 12,000 newly enlisted recruits. To secure Chattanooga Sherman telegraphed Gen. Steedman, who held the place with a small force, "You must organize and systematize the hospitals and men sent back to Chattanooga"; and to a suggestion that he might make use of some of the convalescents he was receiving from Atlanta he replied: "So far, all such detachments reported from the front are with furloughs and are awaiting transportation home."

Under such conditions Gen. Thomas was working most energetically at Nashville to organize an army to meet Hood, while Gen. Schofield, with his inferior force, was holding against him with the utmost stubbornness to gain time for Thomas.

Hood was baffled in his attempt to intercept Gen. Schofield at Pulaski and Columbia, Schofield reaching the latter place, forming solidly before Hood, who arrived 27 November, and holding him there to the limits of possibility. Again, by skilful work, Schofield reached Franklin in advance of Hood, marching his troops at night within rifle-shot of the enemy's lines at Spring Hill. Here Hood threw his army *en masse* upon Schofield, who had taken position around the town. The attack was delivered at 4 P.M., and lasted into the night. It was one of the most desperate assaults of the Confederates on any field, and most depressing for them in its results, five general officers being killed, six wounded, and one captured. (See FRANKLIN, BATTLE OF.) The night of the 30th Schofield withdrew to Nashville, and the morning of 1 December Thomas' army was united.

A part of A. J. Smith's veteran division arrived at Nashville during the battle of Franklin, but not in time to be sent to Gen. Schofield. The rest of his division, and Gen. Steedman's division from Chattanooga also arrived 1 December.

Hood advanced the day after the battle of Franklin and established his lines in front of Nashville 2 December. Not until Hood appeared before Columbia with the entire army that had confronted the three armies under Sherman, re-enforced with Forrest's 10,000 cavalry, and the fact appeared that Schofield was fighting a gallant, almost desperate game to hold him back while Thomas was working energetically to organize his forces, did the authorities at Washington and City Point realize that Thomas had been left with wholly inadequate means. In reply to a telegram from Gen. Grant in which he was directed not to "let Forrest get off without punishment," Gen. Thomas, 24 November, thus stated his real condition.

> Your despatch of 4 P.M. yesterday just received. Hood's entire army is in front of Columbia, and so greatly outnumbers mine at this time that I am compelled to act on the defensive. None of General Smith's troops have arrived yet, although they embarked at Saint Louis on Tuesday last. The transportation of Generals Hatch's and Grierson's cavalry was ordered by General Washburn I am told, to be turned in at Memphis, which has crippled the only cavalry I had at this time. All of my cavalry was dismounted to furnish horses to Kilpatrick's division, which went with General Sherman. My dismounted cavalry is now detained at Louisville, awaiting arms and horses. Horses are arriving slowly, and arms have been detained somewhere en route for more than a month. General Grierson has been delayed by conflicting orders in Kansas, and from Memphis, and it is impossible to say when he will reach here. Since being placed in charge of affairs in Tennessee, I have lost nearly fifteen thousand men discharged by expiration of service and permitted to go home to vote. My gain is probably twelve thousand perfectly raw troops. Therefore, as the enemy so greatly outnumbers me, both in infantry and cavalry, I am compelled for the present to act on the defensive. The moment I can get my cavalry, I will march against Hood, and if Forrest can be reached he shall be punished.

This created a feeling at Washington and City Point approaching a panic. It was feared that Hood might avoid Thomas, cross the Cumberland, and carry out President Davis' plan to have him push on to the Ohio. This fear was redoubled when the necessity appeared for Schofield to retire from Franklin. It was not so clearly seen that his stubborn holding against Hood had saved the situation which Sherman created. Instead of leaving Thomas, who up to that time had never lost a movement or a battle, to deal with Hood as his full knowledge of the situation might suggest, it was insisted that he should at once attack. The straits of the situation were recognized at City Point, and the day after Schofield's arrival Grant telegraphed: "Arm and put in your trenches your quartermaster's employees, citizens, etc." The fourth day Thomas was peremptorily ordered to attack. He calmly went on with his energetic preparations to deal a final blow to Hood. His despatches, clearly showing his situation and his active work, were ridiculed by Stanton and Halleck, and Grant repeated his orders to attack, and next directed Halleck to relieve him, first with Schofield, and next with Logan, and Grant himself started to take general direction, although Thomas had explained that while he had the troops ready to attack, a sleet-storm had covered the country with a sheet of ice upon which neither men nor horses could move, but that the moment it melted he would attack. When Logan reached Louisville he was met with the news of an overwhelming victory.

The two-days' battle, 15 and 16 December, was remarkable for its perfection of plan, and for the fact that in its progress to the end this plan was closely followed.

The Confederate main and advanced lines were intrenched on bold hills about two miles from the city. Their advanced salient was established within three eighths of a mile of the Union centre. The Union lines extended from the river above the city to the river below it. The Confederate lines were compact between the Murfreesboro railroad at their right and the Hillsborough turnpike, which ran south from the centre of the city, across the Union centre. Thus the Confederate lines covered less than half of the Union position. Cheatham's corps was on the right, Lee's corps formed the centre, and Stewart's corps the left.

More than half the inner line was held by quartermasters' employees under Q. M. G. Donaldson, and the rest of that line by new troops

under Gen. J. F. Miller. Gen. A. J. Smith's corps held the right of the advanced Union line, Gen. T. J. Wood's line the centre, and Gen. Schofield the left. Gen. Steedman's division was in echelon to the front on the left. The night before the battle Gen. Schofield's corps was moved to the left and front of Wood's line, and prepared to take prominent part in turning the Confederate left. The morning of the 15th fog veiled the rapid formation of Union forces in front of their works.

The battle began at 8 o'clock by a successful attack by Gen. Steedman's division upon the earthworks commanding the extreme left. This attracted the enemy's attention to that quarter. About 10 o'clock Smith's corps moved against Hood's left, and Wilson's cavalry corps of 9,000 horsemen and 3,500 dismounted men swung off in its wide circuit against the left and rear of the Confederate works, one division extending to the river below the city, and forcing back Hood's cavalry reserve under Gen. Chalmers. Forrest's main body had been sent to attack Murfreesboro. Smith's corps moved obliquely against the Confederate left flank and took it in reverse. Schofield, by a wide detour, penetrated still further to the rear. At the same time Wood assaulted in front. Wilson's troopers carried earthworks, captured 27 guns, and swept squarely into the rear of the Confederate left. These movements compelled its withdrawal for two miles. The next afternoon the same tactics were continued by Smith, Schofield, and Wilson, while Wood on the Union centre, and Steedman on the left, pushed forward to Hood's new line. This had been reformed with Cheatham on the left, Stewart in the centre, and Lee on the right. The Union lines began the attack upon Hood's position at 3 o'clock with an unsuccessful assault by two brigades from Wood and one from Steedman upon the Confederate right. Soon after 4 o'clock Smith and Wood's corps on the front, with Schofield operating on their right and against the Confederate left flank, attacked in force, soon carrying the entire line. This attack and its results Gen. Hood thus described in his official report: "The position gained by the enemy being such as to enfilade our line caused in a few moments our entire line to give way, and our troops to retreat down the pike in the direction of Franklin, most of them, I regret to say, in great confusion, all efforts to reform them being fruitless." Here 54 guns in position were captured. There was immediate and hot pursuit for 9 days, led by Wilson's cavalry, when the remnant of Hood's forces crossed the Tennessee, having suffered a loss during his campaign of over 13,500 prisoners and 72 guns, and here the Union pursuit ended. Over 2,000 deserters came into the Union lines.

The result vindicated Thomas' insisting upon waiting for the remounting of his cavalry, since Wilson with his troopers formed an essential and controlling element in the battle and in a pursuit which were designed to disintegrate an army.

The records do not show the number of men with which Hood reached Tupelo. He claims that there were 18,500 left there after 3,000 were furloughed. He further says that of 14,000 that left Tupelo to join Gen. J. E. Johnston in North Carolina 9,000 deserted. Gen. Johnston's reports show that when Hood's forces reached him they numbered 3,953 officers and men. Thus, after Nashville, Hood's splendid force of Confederate fighters did not again appear as an army on the theatre of war.

Even this complete victory, defeating the contemplated advance of the Confederate army to the Ohio, did not fully allay the panic at Washington lest Sherman's movement to the sea should prove to have left the Central West without sufficient protection, and while every possible effort in pursuit was being put forth in horrible weather, Gen. Halleck thus telegraphed Thomas:

> Permit me, General, to urge the vast importance of a hot pursuit of Hood's army. Every possible sacrifice should be made, and your men for a few days will submit to any hardships and privations to accomplish the great result. If you can capture or destroy Hood's army General Sherman can entirely crush out the rebel military force in all the Southern States. He begins a new campaign about the first of January, which will have the most important results if Hood's army can now be used up. A most vigorous pursuit on your part is, therefore, of vital importance to General Sherman's plans. No sacrifice must be spared to obtain so important a result.

Gen. Thomas, nagged beyond endurance, put an end to this style of despatches by the following reply:

> Your despatch of 12 M., this day, is received. General Hood's army is being pursued as rapidly and as vigorously as it is possible for one army to pursue another. We can not control the elements, and you must remember that, to resist Hood's advance into Tennessee, I had to reorganize and almost thoroughly equip the force now under my command. I fought the battle of the 15th and 16th instant with the troops but partially equipped; and, notwithstanding the inclemency of the weather and the partial equipment, have been enabled to drive the enemy beyond Duck River, crossing two streams with my troops, and driving the enemy from position to position without the aid of pontoons, and with but little transportation to bring up supplies of provisions and ammunition. I am doing all in my power to crush Hood's army, and, if it be possible, will destroy it. But pursuing an enemy through an exhausted country, over mud roads completely sogged with heavy rains, is no child's play, and can not be accomplished as quickly as thought of. I hope, in urging me to push the enemy, the department remembers that General Sherman took with him the complete organization of the Military Division of the Mississippi, well equipped in every respect, as regards ammunition, supplies, and transportation, leaving me only two corps, partially stripped of their transportation to accommodate the force taken with him, to oppose the advance into Tennessee of that army which had resisted the advance of the army of the Military Division of the Mississippi on Atlanta, from the commencement of the campaign till its close, and which is now, in addition, aided by Forrest's cavalry. Although my progress may appear slow, I feel assured that Hood's army can be driven from Tennessee, and eventually driven to the wall by the force under my command. But too much must not be expected of troops which have to be reorganized, especially when they have the task of destroying a force, in a winter's campaign, which was able to make an obstinate resistance to twice its numbers in spring and summer. In conclusion, I can safely state that this army is willing to submit to any sacrifice to crush Hood's army, or to strike any other blow which may contribute to the destruction of the rebellion.

This changed the tone of despatches from Washington and City Point. Grant and Stanton sent congratulations, and Grant, in his official report, after setting forth his impatience and apprehensions that Hood would go north, said of Thomas: "But his final defeat of Hood was so complete, that it will be accepted as a vindication of that distinguished officer's judgment."

H. V. Boynton.

Nashville, University of, in Nashville, Tenn., a coeducational institution founded in 1785 by the State of North Carolina as Davidson Academy. In 1806 after Tennessee had been

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JAMES NASMYTH,

INVENTOR OF THE STEAM HAMMER AND STEAM PILE DRIVER.

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founded, the name was changed to Cumberland College, and in 1826 to the University of Nashville. The school was closed during the Civil War. The trustees of the university and of the Peabody Fund united in 1875 in establishing a normal school for the training of teachers. Montgomery Bell Academy and Winthrop model school constitute the preparatory department, and the other departments are collegiate and medical. The courses of study lead to the degrees of A.B., B.S., and B.L. In 1902 there were connected with the school 35 professors and instructors and about 900 students. In the preparatory department there were 325 pupils. The library contained over 20,000 volumes, and the grounds, buildings and furnishings were valued at $205,000; the productive fund was about $106,500; and the annual income about $80,000.

Nashville Convention, in American history, a convention of delegates from the Southern States held at Nashville, Tenn., in June 1850, called to consider the slavery question and the encroachments of Northern abolitionists. The Wilmot Proviso and the Missouri Compromise were disapproved, but resolutions of open resistance advanced by Texas, South Carolina and Mississippi were voted down. The convention which was never generally popular, met again in November, and again moderate resolutions were adopted.

Nasik, nä'sĭk, or **Nassick,** India: (1) the capital of a district of Bombay on the Godavari, 31 miles from its source, and 100 miles northeast of Bombay. It is the headquarters of Brahmanism in the Deccan and one of the most sacred of Hindu pilgrim resorts; the banks of the river here are crowded with temples and shrines. Nasik is the Nasica of Ptolemy and was anciently a Mahratta capital. It has noted manufactures of brass and copper work, paper, cotton, etc. Pop. (1901) 21,500. (2) The district has an area of 5,940 square miles; pop. (1901) 819,575.

Nasmyth, nā'smĭth, **Alexander,** Scottish painter: b. Edinburgh 9 Sept. 1758; d. there 10 April 1840. He chose portrait painting as his specialty; became Allan Ramsay's pupil and subsequent assistant and accompanied that artist to London. He returned to Edinburgh (1779); and traveled in Italy (1782), where he devoted himself to landscape and historical painting. Among his works is the famous portrait of Burns in the London National Gallery, the large 'River Scene' owned by the Society of Arts; 'The Port of Leith' (1824); and 'The Lawn Market' (1824); in 1822 he published 16 scenes described by Sir Walter Scott. His landscapes are finely composed and very impressive, though he is inferior as a painter to his son Patrick (q.v.). The Nasmyths were an artistic race and between 1829 and 1866 no less than six woman painters of the family exhibited in London.

Nasmyth, James, Scottish engineer: b. Edinburgh 19 Aug. 1808; d. South Kensington, 7 May 1890. He was the son of Alexander Nasmyth (q.v.), the Scottish landscape painter. After study at Edinburgh University, he went to London in 1829, offered his services to Maudsley, founder of a well known engineering firm, and was appointed assistant in his private workshop. There he remained till 1831, when he returned to Edinburgh, and constructed a set of engineering tools with which he began business in 1834 at Manchester. Here he was so successful that he had soon to erect a large new workshop at Patricroft near Manchester, where he became famous as a machine constructor and inventor. Chief among his inventions was the steam-hammer, designed in 1839, and in 1842 patented in an improved form. The first hammer was constructed from a view of Nasmyth's sketches by Schneider at Creuzot, in France, about 1841; but the first British one was erected by Nasmyth at Patricroft in 1843. Among Nasmyth's further inventions are a nut-shaping machine, a hydraulic punching-machine, and a flexible shaft for driving small drills. In 1856 he retired from the firm of Nasmyth, Gaskell & Co., which he had founded, and devoted himself to the study of astronomy. He was the first to observe the mottled appearance of the sun's surface known as "willow-leaves" or "rice grains" (1860). He is the author of 'Remarks on Tools and Machinery' in Baker's 'Elements of Mechanism' (1858); 'The Moon Considered as a Planet, a World, and a Satellite' (1874), with James Carpenter; and an autobiography edited by Dr. S. Smiles (1883).

Nasmyth, Patrick Milner, Scottish painter: b. Edinburgh 7 Jan. 1787; d. Lambeth, London, 17 Aug. 1831. He studied under his father and developed a great talent for landscape, though he labored under the difficulties of ill health, and a crippled right hand which necessitated the use of the left in painting. He came to London in his 20th year and made his reputation by his first picture exhibited at the Royal Academy 'A View of Loch Katrine' (1809). He invariably painted *en plein air,* and in his last sickness was raised on his bed that he might watch through the window the violent thunderstorm that was raging outside and in the progress of which he expired. His pictures are highly valued and his 'View in Surrey' sold (1892) for £2,625 ($13,125).

Naso, nä'sō. See OVID.

Na'son, Elias, American biographer: b. Wrentham, Mass., 21 April 1811; d. North Billerica, Mass., 17 June 1887. He was graduated from Brown University in 1835, engaged in teaching and was ordained a Congregationalist minister in 1852. He was the author of: 'Life of Governor Andrew' (1868); 'Life of Charles Sumner' (1874); 'Lives of Moody and Sankey' (1877); 'Originality' (1882); and many other works.

Nason, Emma Huntington, American poet: b. Hallowell, Maine, 6 Aug. 1845. She was graduated from the Maine Wesleyan Seminary and Female College in 1865 and was married to C. H. Nason of Augusta, Maine, where she has since resided. She has published 'White Sails' (1888), and 'The Tower, with Legends and Lyrics' (1895).

Nasqa, näs-hä'. See NASS INDIANS.

Nasr-ed-Deen, näs'r-ĕd-dēn', Shah of Persia: b. 24 April 1831; d. 1 May 1896. He was not the eldest son but the ability and influence of his mother induced his father, Mohammed Mirza, to proclaim him his heir and he succeeded to the throne in 1848. His accession was disputed by the reformer El Bab, but the new

shah crushed the opposition mercilessly and became the ablest ruler that Persia had had in many years. He studied European methods of warfare and proved himself a master of finance. He crushed the insurrections which broke out in various provinces and by his occupation of Herat in 1856 provoked a war with Great Britain which was concluded in 1857. In 1873-8 and in 1889 he visited Western Europe and endeavored to establish more friendly relations with England, soon, however, returning to his friendship with Russia. He favored progress and western civilization in so far as it did not conflict with his despotic rule, and under his reign the telegraph through Persia connecting Europe and India was built. He was assassinated in 1896.

Nass (näs) **Indians**, or **Nasqa**, or **Nishgar**, a general name for several tribes residing on the Nass River, British Columbia. They live in seven villages and number perhaps 1,000. They have not decreased in numbers in recent years and are steadily improving in morals and intelligence.

Nassau, näs'sow, **Joan Mauritz van**, COUNT OF NASSAU-SIEGEN, Dutch general and statesman: b. Delft, Holland, 17 June 1604; d. Cleves, Prussia, 20 Dec. 1679. He was governor-general of the Dutch possessions in Brazil in 1637–44 and had a brilliant and prosperous administration. He defeated the Spanish and Portuguese and upon his return to Holland was made lieutenant-general of cavalry; in 1647 he was governor of Cleves and in 1665 commanded the army of the Netherlands. He became governor of Utrecht in 1674.

Nassau, Germany, a former independent duchy, now as Wiesbaden, forming a district of the Prussian province of Hesse-Nassau (q.v.). The chief town is Wiesbaden (q.v.). The family of Nassau, the elder branch of which reigned till 1866, dates from the 10th century. The younger branch inherited in 1544 the principality of Orange (q.v.), and as the princes of Orange took an important place in European history. The reigning Duke of Nassau sided against Prussia in 1866, and his duchy was incorporated with Prussia (see PRUSSIA: GERMANY). On the extinction of the male line of the Orange branch by the death of William III. of Holland, in 1890, the Duke of Nassau became Grand-Duke of Luxemburg.

Nassau, näs'â, the capital of the Bahama Islands (q.v.), situated on the north coast of New Providence, the largest island of the group. The town is built on a steep hill, is well laid out, and has fine government and other public buildings, and handsome residences. The climate is mild and healthful, and Nassau is a popular winter health resort for Americans and West Indians. There is a good harbor, and an active general trade is carried on. The United States is represented by a consular agent. Pop. 10,000.

Nassau, Fort, N. J., a former fort on the Delaware River, near the present site of Gloucester, N. J. The fort was built by Capt. Jacobus May, in 1831.

Nasse, näs'sĕ, **Erwin**, German political economist: b. Bonn 2 Dec. 1829; d. there 4 Jan. 1890. He was educated in Bonn and became prominent as an economist. In 1869–79 he served in the Prussian Lower House and in 1889 became a member of the House of Peers. He founded and was president of the Verein für Socialpolitik. He published: 'Ueber das preussische Steuersystem' (1861); 'Ueber die mittelalterliche Feldgemeinschaft in England' (1869); 'Agrarische Zustände in England' (1884); etc.

Nassick. See NASIK.

Nast, Thomas, American caricaturist: b. Landau, Bavaria, 27 Sept. 1840; d. Guayaquil, Ecuador, 7 Dec. 1902. His mother brought him to this country in 1846. He was employed as doorkeeper in Bryant's Art Gallery, Broadway and 13th Street, New York, where he spent his spare time copying the paintings. For six months he studied in a drawing class, then became a draughtsman for 'Frank Leslie's.' In 1860 he was sent to England to draw for the 'Illustrated News' the Heenan-Sayers prize fight; in 1861 drew sketches of the Italian campaign; in 1862 joined the 'Harper's Weekly' staff and by his clever cartoons soon became famous. But with his purely political and personal caricatures dating from 1871–3, when he attacked the Tweed Ring in New York city, drew the money-bag head of Tweed and the first Tammany tiger, and largely contributed to the defeat of the Ring, he came to new fame and power. He bitterly opposed Greeley in 1872, Tilden in 1876, and Hancock in 1880, urging against each of these nominees his inevitable connection with Tammany Hall. In 1884 he attacked the Republican candidate for the only time, but with unusual bitterness. He left 'Harper's Weekly' in 1887, and in 1894 became a member of the staff of the *Pall Mall Gazette*. In May 1902 he was appointed United States consul at Guyaquil, where he died of yellow fever. For several years he published 'Nast's Almanac,' with his own illustrations to text by various authors. Nast did some oil-painting, especially of scenes in the Civil War. He was a great caricaturist, as realistic as the French masters in his groups and as dignified as Tenniel in his single figure cartoons.

Nastur'tium, the Indian cress (*Tropæolium majus*), an American climbing annual with pungent fruits and showy orange flowers; or *T. minus*, a smaller species. See TROPÆOLIUM; CRESS.

Na'sua. See COATI.

Nat Turner's Rebellion, in American history, a term applied to a negro insurrection at Southampton, Va., in 1831. The rebellion was led by Nat Turner, a negro slave, who believed himself chosen by God to free the colored race. At an appointed time he set out with several hundred followers going from house to house with the intention of killing all white persons. Before the authorities dispersed the rebels 55 persons were killed. After hiding for some weeks in the Dismal Swamp, Turner was captured and hanged.

Nata, nä'tä, in Mexican mythology, the name of a former legendary prophet, who resembled the Noah of Biblical times.

Natal, na'täl', Africa, a British colony on the southeast coast, bordering on the Indian

Ocean, and bounded by Portuguese East Africa, the Transvaal, and Orange River colonies, Basutoland, and Cape Colony. Including Zululand, annexed in 1897, it has an estimated area of 35,019 square miles. In January 1903 the former Transvaal districts of Vryheid, Utrecht, and part of Wakkerstroom were transferred to Natal.

Topography.— The chief natural boundary on the land side is formed by the Drakensberg Mountains, separating it from the Orange River Colony and Basutoland. The Tugela River separates the colony proper from the Zulu country; on the southwest the Umzimkulu and Umtamvuna partly separate it from Cape Colony. The 400 miles of coast-line contains the mouths of numerous streams, but is destitute of creeks and bays, having only one sheltered anchorage at Port Natal (on which stands the seaport Durban), a fine circular bay completely landlocked, capacious enough to contain whole fleets, and deep enough within to float the largest vessels. The surface is finely diversified, rising by successive terraces from the shore toward the lofty mountains on its western frontiers. The chief summits are Champagne Castle, 10,357 feet; Mont aux Sources, about 10,000 feet; and Giant's Castle, 9,657 feet. From the main chain numerous transverse branches proceed nearly at right angles, and form a series of minor watersheds, separating the different streams. The mountains descend very gradually on the west, and may be regarded as the abutments of a very elevated table-land, but they present precipitous fronts to the east, and are so broken by chasms and ravines that they were at one time regarded as impassable.

Hydrography.— The colony has a great advantage over most of the districts of South Africa in its abundance of perennial streams, though these are all too shallow to be navigable, while many flow through precipitous ravines and rocky gorges. The most important rivers are the Tugela, which has a course of about 150 miles, its tributary, the Buffalo, or Umzinyati, being also a considerable stream; the Umvoti, Umgeni, and Umkomanzi, farther to the south; and the Umzimkulu, which partly separates Natal from Cape Colony.

Geology and Mineral Resources.— The prevailing stratified rocks are sandstone and slate, often thrown into confusion and pierced by igneous rocks, particularly basalt, greenstone, and porphyry, which assume the form both of continuous ridges and isolated hills, and often cover extensive areas. The mineral productions are principally coal, iron-stone, limestone, and marble. Coal is worked and is used on the railways, and the iron-stone is also being utilized. There are rich gold-fields in Zululand.

Climate.— The climate on the whole is extremely salubrious. On the coast the range of temperature is from 47° to 88°, giving an average in summer of 76° and in winter of about 55°; in the interior, at the town of Pietermaritzburg, the mean temperature of July, the coldest month, is 55°; of February, the hottest, 80½°; and of the whole year, 67°. During the rainy season (October to March) thunder showers are of almost daily occurrence. Long droughts are almost unknown.

Vegetation.— Under such a climate, and with a soil of considerable fertility, vegetation is obviously vigorous. Timber-trees everywhere exist in sufficient numbers for the wants of the colony, and on the western frontiers as well as elsewhere form considerable forests, for the most part unencumbered by the underwood which prevails in Cape Colony.

Fauna.— The wild animals include the leopard, hyena, tiger-cat, antelopes, jackal, ant-bear, and porcupine. The hippopotamus has still his haunts in several of the rivers, and there are numbers of small crocodiles; while snakes, some of them venomous, are also plentiful. The birds comprise the vulture, several varieties of eagle, and the secretary-bird, etc.

Agriculture.— In the level districts of the interior, wheat, barley, oats, beans, and vegetables of almost every description have been largely and successfully grown; but the chief crop everywhere is maize, of which even two good crops can be raised in the year. In many parts the vine thrives well, various fruits are cultivated, and could be produced in unlimited quantities. In the coast districts, where the climate is tropical, the sugarcane is cultivated with success. In similar localities tobacco, arrowroot, ginger, bananas, pine-apples, etc., also grow well. Tea has begun to be cultivated with good prospects, and coffee is also grown to a small extent.

Commerce, etc.—In 1901 the total value of exports amounted to about $23,000,000, wool being by far the largest, others being gold, sugar, coal; the imports were valued at about $48,000,000, mostly manufactured goods. The railways, which belong to the government, have a length of over 600 miles, and extend into the Orange River Colony and Transvaal.

Government.— Natal has since 1893 been under a governor, a legislative council, and a legislative assembly. The governor represents the king, and is appointed by the home government. He appoints an executive of not more than six ministers, and with their advice nominates the members of the legislative council, a body consisting of 12 persons. The legislative assembly consists of 39 elected members, the electors having the right of voting in virtue of a small property qualification. The assembly is elected for a term of four years, but may be dissolved before the end of this period. All bills must receive the governor's assent before they become law. For administrative purposes the colony is divided into counties, of which that of Pietermaritzburg is so named from containing the capital, situated about 54 miles inland. The only seaport, and the largest town, is Durban, on Port Natal. There are somewhat special regulations for Zululand, which at present bears the designation of a "province." Education is well attended to, there being government high and primary schools, many aided private schools, and schools for Kaffir and coolie children.

History.— Natal owes its name to having been discovered on Christmas Day, 1497, by Vasco da Gama. In 1823 a small English settlement was formed on Port Natal. Subsequently large numbers of discontented Boers from the Cape Colony entered the country as settlers. A treacherous massacre of part of the Boers by Dingaan, chief of the Zulus, in 1838, led to hostilities, in which Dingaan was ultimately driven beyond the frontiers. In 1839 the Boers pro-

claimed themselves an independent republic, also declaring their determination to establish diplomatic relations with European powers. The establishment of a hostile settlement at the only port between Algoa and Delagoa bays, and at a valuable entrance from the coast to the interior of South Africa, was so obviously incompatible with British interests that a force was despatched from the Cape, and after some fighting the Boers submitted, except a discontented section, who retired beyond the Drakensberg range. The territory was proclaimed British in 1843. It formed an integral part of the Cape Colony until 1856, when it was erected into a separate colony. Its prosperity has been affected by the Kaffir troubles, as well as by the British complications with the Transvaal Boers; and in 1899–1900 it suffered severely in the South African war (q.v.). Pop. (1901) 925,118, including 786,912 Kaffirs, 74,385 Asiatics, and 63,821 Europeans; the newly transferred Transvaal districts, already mentioned, give an additional 58,000, comprising 50,000 Kaffirs and 8,000 Europeans.

Natal, Brazil, the principal seaport and capital of the state of Rio Grande do Norte, at the mouth of the river of that name, on the Atlantic, 150 miles north of Pernambuco. Notwithstanding the sand-bars at the entrance to the harbor, considerable export trade is carried on chiefly of cotton, sugar, rubber, etc., about $1,000,000 annually. The United States is represented by a consular agent. Natal was originally called CIDADE DOS REIS. Pop. 10,000.

Natalie, năt'a-lē, a queen of Servia: b. 14 May 1859. She is a daughter of Pierre Ivanovitch Keschko, a Russian officer, and married Prince Milan, afterward king of Servia, in 1875. The marriage turned out unhappily, and the union was broken in 1888, when Milan obtained a divorce. The king abdicated in the following year, and Natalie, returning to Belgrade, the Servian capital, resided there for a time with her son, King Alexander, enjoying the favor of the people; but in 1891, at the request of the National Assembly, left the country on account of political interests. Becoming reconciled to Milan in 1893, she resumed her former relations with the royal family; and returning to Belgrade in 1895, she was greeted by the people with every token of popularity. Her residence has since been chiefly in Biarritz, France; and after the assassination of King Alexander (1903) the political authorities at Belgrade decreed that she should not again enter the Servian kingdom.

Natato'res, an obsolete group of birds, the swimmers, artificially allied by Illiger on their likeness in pursuing an aquatic life, but structurally having relationships with several natural orders. Similar illogical groupings in the same by-gone but once popular classification were *Clamatores,* the screamers; *Scansores,* the climbers; *Cursores,* the runners; etc.

Natchez, năch'ĕz, Miss., city, county-seat of Adams County; on the Mississippi River, and on the Yazoo & M. V. and the New Orleans & N. R.R.'s; about 90 miles in direct line southwest of Jackson and 65 miles below Vicksburg. It has steamer connection with all the Mississippi River ports. The city is on a bluff about 200 feet above the river. On this bluff was located the first settlement, by Bienville, who built here Fort Rosalie in 1716. The place was destroyed and many of the inhabitants murdered, in 1729, by the Natchez Indians. The fort came into possession of the English in 1763, when the name was changed to Fort Parmure. In 1779 the Spaniard took possession, and in 1798 the Unite States became undisputed owner of lands east of the Mississippi, which included Natchez and much of the adjacent territory. From 1798 to 1820 Natchez was the capital of Mississippi; in 1803 it was incorporated as a city. During the Civil War the city suffered considerable loss of property and damage to its industries and commerce. In 1862 Commodore Porter shelled the city, and in 1863 Federal troops took possession and retained control until peace was declared. The country surrounding Natchez is chiefly devoted to agriculture; cotton is the principal product. The principal industries of the city are connected with the manufacturing and shipping of cotton products. It has ice factories, planing mills, foundries, machine-shops, and furniture factories. Natchez has a large trade in cotton, shipping each year thousands of bales. Considerable rice and sugarcane are shipped from this port. On a bluff just outside the city limits is a National cemetery, which contains 3,159 graves, 2,780 of unknown dead. The city has Memorial Park, Temple Opera House, a court-house, the city public buildings, Institute Hall, several excellent hotels, and a large number of handsome residences. It is the seat of Stanton College and Natchez Institute, and has good public and parish schools, and the Fisk Library. There are two orphanages and a number of private schools. The government, in accordance with the charter of 1877, is vested in a mayor, who holds office two years, and a council. The school board are elected by the council. Pop. (1890) 10,101; (1900) 12,210.

Natchez Indians. See CREEKS.

Natchez, nä-chāz, **Les,** a romance by Chateaubriand, published in 1825–6, many years after the author first planned it. The work was written during his exile in England, long after his journeyings in America, of which country it contains his views as well as setting forth his psychological speculations and philosophy of life. It is pervaded by the elements of that romanticism with which, through this and other works, the name of Chateaubriand (q.v.) is associated.

Natchitoches, năch-ĭ-tŏch'ĕz, an American Indian tribe formerly living along the banks of the Red River, in Louisiana. They were driven from their homes by the Natchez and united with the Caddoes in 1731.

Natchitoches, năk-ĭ-tŏsh', La., town, parish seat of Natchitoches Parish; on a short stream which flows into the Red River, and on the Texas & Pacific railroad; about 150 miles in direct line northwest of Baton Rouge, the capital of the State. The town is on the site of what was once a French trading post established in 1714. It is situated in an agricultural region in which the chief products are sugarcane and cotton. Considerable attention is given to stock-raising. The principal industries of the town are connected with the shipment of the agricultural products and live-stock. It is the seat of the State Normal School and of Saint Mary's Academy (R. C.); and it has a high school, public

and parish elementary schools. Pop. (1890) 1,820; (1900) 2,388.

Na'than, Hebrew prophet in the time of David and Solomon. He was probably much younger than David, and lived late into the reign of Solomon. He was in his time the latest direct descendant and representative of the schools of the prophets under Samuel. Saint Jerome mentions a Jewish tradition which identifies him with the eighth son of Jesse, but there is no ground for this supposition. His earliest appearance in the history of David is as the King's counsellor, first advising the building of the temple and then after a vision announcing that the time had not yet come (about 1010 B.C.). His power, eloquence and tact as a prophet are shown by his exquisite apologue of the ewe lamb which brought David to a sense of his guilt in the case of Bathsheba (1000 B.C.). On the birth of Solomon the prophet named the child Jedidah, "beloved of the Lord," and was entrusted with his education. When the end of David's reign approached Nathan advocated the succession to Solomon, counseled Bathsheba to secure it, and rebuking the indifference of the King, obtained his presence and assistance at the inauguration of his successor (977 B.C.). Nathan's sons occupied high posts in the new court, Nabud being "the King's friend" and principal officer or chamberlain, while Azariah was over the "twelve officers which provided victuals for the King and his household." It was in accordance with the counsels and suggestions of this prophet that David, the year after his son's accession, crowned the work of his life, as poet, musician, and promoter of a rich temple ritual, by introducing into public worship an orchestra of Levites. Eccles. ix. 14–16, a passage attributed to Solomon, is evidently an imitation of 2 Sam. xii. 1–4, which shows how the influence of Nathan was perpetuated in the literature of succeeding ages. He left two works behind him, a life of Solomon and a life of David. He died about 935 B.C., and his grave is still pointed out at Halhul, five miles north of the ancient Hebron.

Nathan the Wise, a dramatic poem by Gotthold Ephraim Lessing, published in 1779. It expresses Lessing's ideal of the theatre as the pulpit of humanity and is concerned with the search for truth under all creeds, the protest of natural kinship against the artificial distinctions and divisions of mankind on religious grounds, and the elevation of brotherly love to the highest place in the Divine favor. The scene is in Jerusalem and the plot turns upon the fortunes of a certain Christian knight in wooing for his bride Recha, the supposed child of the Jew Nathan. Moses Mendelssohn, the friend of Lessing, is portrayed in the character of Nathan. Consult translation of 'Nathan the Wise,' by Ellen Frothingham (1868).

Nathan'ael, one of the earliest believers in and follower of Christ. He was a native of Cana in Galilee, and attached himself to Jesus on becoming convinced of the Messiahship of the son of Mary by his miraculous insight and power of reading the heart (Saint John i. 46–49). On the hypothesis that he was one of the twelve he has been identified with Bartholomew, but on insufficient grounds. There is a tradition that Nathanael was the bridegroom at the marriage at Caana, and Epiphanius implies that he was one of the two disciples whom Jesus overtook on the way to Emmaus.

Nat'ica, a genus of sea-snails, forming the type of the family *Naticidæ*. The shell is globose in form, the spiral portion being minute and indistinctly marked; smooth and porcelain-like, and its aperture of large size and semicircular form. The animal appears large in proportion to the shell, the foot especially being extensive. The mantle-lobes partly conceal the shell, and an operculum is always present. Most of the genera of this family are marine, and the white, chalky *N. heros* is a familiar species all along the eastern coast of the United States, and lays its eggs in a collar-shaped mass of glutinous material mixed with sand which often excites the curiosity of the stroller by the seaside. This shell is the one most frequently chosen by our hermit-crabs. Consult Arnold, 'The Sea-Beach at Ebb Tide' (1901).

Natick, nā'tĭk, Mass., town in Middlesex County; on the Charles River, and on the Boston & Albany railroad. The head of Cochituate Lake, one of the sources of the water supply of Boston, is in the northwest part of the town. The place was founded by John Eliot (q.v.), and from 1651 to the time of the founder's death, it was used chiefly as a home for converted Indians. In 1781 it was incorporated as a town. The chief manufactures are shirts, men's clothing, boots, shoes, edge tools, boxes, baseballs, and supplies for athletic games. A monument in honor of John Eliot is in one of the public parks and a soldiers' monument in another park. Some of the educational institutions are the Morse Institute, the Walnut Hill High School for young women, and the Bacon Public Library. Pop. (1890) 9,118; (1900) 9,488. Consult: Hurd, 'History of Middlesex County, Mass.'; Bacon, 'History of Natick.'

Nation, either a people inhabiting a certain extent of territory and united by common political institutions; or an aggregation of persons of the same ethnological family and speaking the same or cognate language. See GOVERNMENT.

National Academy of Design. See ACADEMY OF DESIGN, NATIONAL.

National Academy of Sciences. See ACADEMY OF SCIENCES, THE NATIONAL.

National Airs. See NATIONAL SONGS.

National Arts Club, organized in New York city, to promote acquaintance among art workers and art lovers, to provide proper exhibition facilities, and to encourage the publication of works on art. The club holds monthly exhibitions.

National Assembly. See ASSEMBLY, NATIONAL.

National Association for the Promotion of Social Science, a British institution designed to promote the increased cultivation of physical science and the facilitating of friendly intercourse among its followers. In addition, however, to the subjects relating to this branch of knowledge, a series of highly important questions bearing vitally on the well-being and prosperity of the country have largely engaged public attention of late years. They comprehend

the science of social economy in all its branches, as regards public health and morality, education, crime, with its causes, prevention, and punishment, the mutual relations of employer and employed, and generally all those phases and laws which result from the social compact and develop themselves proportionately with the advancement of civilization and refinement. The project of establishing an association which should be specially devoted to the investigation and discussion of these topics was first suggested to Lord Brougham in the end of 1856. The first meeting was held at Birmingham in 1857, and meetings were subsequently held in London, Edinburgh, Glasgow, Dublin, Manchester, Liverpool, Newcastle, Aberdeen, Bristol, and other important towns. Many valuable and interesting papers were read at the meetings of the society, which published annually a volume of Transactions containing the most important reports, addresses, and papers.

National Association of Democratic Clubs, The, an organization formed 4 July 1888, of 21 local clubs; which had increased in 1903, to over 10,000 clubs, with a membership of 1,200,000. The headquarters of the association are in New York city.

National Banking Act. See BANKS AND BANKING; FINANCE.

National Banking System. See BANKS AND BANKING; FINANCE.

National Banks. See BANKS AND BANKING.

National Board of Health, The, a Federal body, instituted by Act of Congress, 3 March 1879, to consist of 11 members; one army surgeon, one navy surgeon, one medical officer of the marine hospital service, one officer of the Department of Justice, and seven physicians from civil life.

National Cemeteries are burial grounds, instituted by Act of Congress, for the interment of United States soldiers who have fallen in battle, and whose graves become, accordingly, a sacred national charge. These graves, 316,236 in number, are distributed in 72 special, or "National," cemeteries, and in 320 of the local cemeteries of the country. The names of 175,764 (more than one half) of the dead have been preserved and attached to the graves. Of the rest it is only known that they died fighting in the Federal armies; their graves marked with the sad inscription, "Unknown United States Soldier." Of the whole number, less than one-fifth now repose in their original graves; 257,520, or more than four-fifths, have been removed from the rude trenches of the battlefields, or from their roadside graves. The largest National cemetery in the country is at Vicksburg, Miss. About 17,000 are interred here. Near by is the cemetery at Natchez, where 3,200 are buried. In the immediate vicinity are the cemeteries of Port Hudson, Baton Rouge and Alexandria. A National cemetery that is very little known is Jefferson Barracks, located about 18 miles below Saint Louis, Mo. Over 11,800 are buried here, and the cemetery is one of the grandest sites in the world. It is about 300 feet above the Mississippi, on the west bank, and commands a view in all directions over the bottom lands. This cemetery is remarkably well kept, although it does not contain as many trees as one feels ought to be there. The National cemetery on the Custer battlefield in Dakota is perhaps the strangest burying-place in all the world. It is a most barren spot, containing an enormous marble shaft, with 414 graves grouped around it. The strange thing about this cemetery is that all those sleeping there were killed on the same day. It is not generally known, but the United States maintains a National cemetery at the City of Mexico. The 6,184 buried there are the victims of the Mexican war. For a complete list of National cemeteries see MILITARY POSTS, U. S.

National Christian League for the Promotion of Social Purity, an American organization with headquarters in New York, founded for the purpose its name implies. The league has established a home in New York for self-supporting women, and has organized an auxiliary known as the Social Culture Club.

National Civic Federation, The, an American organization, founded 16 Dec. 1901; the outgrowth of a number of local conventions representing capital and labor. It is entirely non-partisan in principle, considering such topics as imperialism, trusts, tariff, taxation, etc., with a view of obtaining the clearest understanding of them. The federation is controlled by an executive committee of 30 members and meets annually, or at such other times and in such localities as may be deemed advisable. Its membership consists of men from all parts of the country, including a large number prominent in the various occupations of life. The by-laws of the federation provide the following standing committees: Foreign Relations, Insular Affairs, Banking and Currency, Industrial Combinations, Interstate and Foreign Commerce, Consular and Diplomatic Service, Military and Naval Affairs, Labor, Education, Immigration, Municipal Government, Taxation, Civil Service, Indian Affairs, and the Negro Question. See INDUSTRIAL COMMISSION.

National Conference of Charities and Correction, an American association composed of State boards of public charities and various charity organizations. The National conference is held each year in some city determined upon at a preceding meeting. At these conferences papers are read and general subjects embraced under charity and correction are discussed.

National Convention, in France, a legislative body constituted in the hall of the Tuileries, 17 September, and formally opened 21 Sept. 1792. This convention continued till a new constitution was organized, and the executive directory was installed at the Little Luxembourg, 1 Nov. 1795. The Chartists in England formed a National Convention in 1839. In the United States a National Convention is the meeting once in four years of a political party assembled to select a presidential ticket. See ELECTIONS.

National Covenant, a league formed by Scotch Presbyterians in 1638. See COVENANT.

National Debt. See DEBT, NATIONAL.

National Divorce Reform League. See MARRIAGE AND DIVORCE.

National Education, Systems of. See EDUCATION IN THE UNITED STATES; EDUCATIONAL ORGANIZATION AND ADMINISTRATION.

National Educational Association, an organization of teachers and educators in the United States, formed "to elevate the character and advance the interests of the profession of teaching and to promote the cause of popular education." It was established in 1857 as the National Teachers' Association, and assumed the present name in 1870. Meetings have been held annually in the different States and in Canada, at which important educational questions have been discussed; and the 'Proceedings' (published annually) contain papers of great educational value and interest. Before 1870 all discussions were held before the whole association as a body, but since then various departments have been organized for the consideration of special topics, including normal school and kindergarten departments, and the national council of education, this latter, consisting of 60 members elected from the association, has published several important reports. A permanent endowment of about $90,000 has been secured; the active members of the association in 1903, numbered 2,800, and the associate members attending the annual meetings have averaged 10,000 for the past few years.

National Expansion is the acquisition of territory, whether by conquest, seizure, or purchase. Since the treaty of peace with Great Britain in 1783 the United States has expanded in area about five-fold. By the peace protocol signed by representatives of Spain and the United States, 12 Aug. 1898, it was provided that Porto Rico and other Spanish islands in the West Indies and an island in the Ladrones should be ceded to the United States, and that the latter should "occupy and hold the city, harbor, and bay of Manila pending the conclusion of a treaty of peace, which shall determine the control, disposition, and government of the Philippines." By this treaty the Philippine Islands were ceded to the United States, the latter paying Spain $20,000,000. Subsequently the United States bought two other islands in the vicinity for $100,000. See ANNEXATION; COLONIES AND COLONIZATION.

National Farmers' Alliance. See FARMERS' ALLIANCE.

National Gallery, The, the British national picture gallery; a collection of paintings, in Trafalgar Square, London. It originated in a collection formed by Mr. Angerstein, consisting of 38 pictures, 29 by old masters and 9 by British painters, and purchased with public funds in 1824 for $280,000 as the nucleus of a national gallery. Since that time the collection has been greatly enlarged by purchases out of funds provided by Parliament, as well as by bequests and gifts. Of the latter the most munificent has been that of Mr. Vernon in 1847, a collection of 157 works of English painters. Another highly valuable section is that of the pictures and drawings by Turner bequeathed to the nation at his death in 1851. In 1871 a valuable prize was secured by the purchase for $375,000 of Sir Robert Peel's collection, consisting of 77 paintings and 18 drawings. In 1885 Parliament voted $350,000 for the purchase of a single picture, the 'Ansidei Raphael,' together with $87,500 for another, Van Dyck's 'Charles I. on Horseback.' The National Gallery now comprises fully 1,200 pictures, and though specially strong in examples of the British school of painting, foreign masters are fully represented. The various early and late Italian schools are extensively illustrated; there are good examples of the chief representatives of Italian art, as Raphael, Correggio, Paul Veronese. There are a few good examples of Murillo and Velasquez and the Spanish school; and the great Dutch and Flemish painters, Rembrandt, Rubens, Van Dyck, etc., are well represented.

National Geographical Society. See GEOGRAPHICAL SOCIETY, NATIONAL.

National Grange. See GRANGERS.

National Guard. See MILITIA.

National Hymns. A national hymn as usually understood is the official song rendered on ceremonial occasions, fêtes, and other public gatherings. It is sometimes an air (without words) that is recognized by the government, a march played by bands and orchestras to stimulate patriotism and loyalty to the ruler. While the oldest of national hymns now extant date back less than five centuries, lines breathing the spirit of patriotism were written by Horace and other poets of ancient times. The national song is intimately related with, and probably grew out of, the folk-song. Words and music should convey something of the national temper, should voice the aspiration of a people, and express to some extent the ideas that a nation stands for. Love of fatherland and pride in one's country are the keynotes of many national anthems. In some of them religious feeling is blended with patriotic sentiment. The tune as well as the lyric should be by a native composer. In Europe the writers of national hymns have usually been enlisted in the service of institutionalism. Their productions have been often inspired by devotion to church and state, also by love of home. Considering the lack of poetical merit in most national songs, their influence has been very great. Wars and revolutions have sometimes called them into being, and in these especially the note of freedom is emphasized.

Austria.— The Austrian national hymn, 'Gott erhalte unsern Kaiser,' was written in 1797 by Laurence L. Haschka (1749–1827); music by Joseph Haydn (1732–1809). A stanza is quoted:

God preserve our Franz in glory, Franz our Emp'ror good and great!
High in wisdom, famed in story, we his praises celebrate;
Love of subjects young and hoary bind his crown of regal state,
God preserve our Franz in glory, Franz our Emp'ror good and great!

Hungary. Among the patriotic songs of Hungary the one most frequently heard is 'Isten áld meg a Magyart' (Lord, bless the Hungarian), which is wed to a striking melody. The renowned 'Rákótzy March' has even greater power over Hungarians. Bohemia, now included in the Austrian empire, has two well-known national songs, the 'War-song of the Hussites' (dating back to about 1460) and 'My Fatherland,' composed centuries ago. The names of author and composer are forgotten. The first stanza of this favorite national ditty is:

Where is my house? Where is my home?
Streams among the meadows creeping,

Brooks from rock to rock are leaping,
Everywhere bloom spring and flowers,
Within this paradise of ours;
There, 'tis there, the beauteous land!
Bohemia, my fatherland!

Belgium.— The Belgian national hymn is 'La Brabançonne' (the Song of the Brabantines); music by François van Campenhout (1780–1848). The words were written by Jenneval, a French comedian, who was playing in a theatre of Brussels when the rising took place which resulted in Belgium's independence from Dutch rule in 1830. The refrain plays on the word "orange," referring to the reigning house of Orange in the Netherlands. The first stanza is appended:

Who would have thought the arbitrary
And scheming despot would bring force?
Against us comes a sanguinary
Princeling, with shrapnel in his course.
'Tis done, o'er Belgians comes a change.
No more with Nassau shameful pact shall be.
The grape-shot's shattered the orange
Upon the tree of liberty.

Three other versions of 'La Brabançonne' were written — that by Lonlay in 1848, another by Campenhout, and one by Hymans in 1852 — relating to the political situation in those years.

France.— 'La Marseillaise' (first known as the 'War Song of the Army of the Rhine' and then as the 'Song of the Marseillais') is the greatest of all national hymns. It was composed in one night (24 April 1792) by a young artillery officer, Rouget de Lisle (1760–1836). Although the authorship of the air is in dispute, it has generally been considered his composition. It has also been attributed to Holtzmann and to Dalayzac (a noted French composer). The song gave articulate expression in the spirit of the Revolution and has been the inspiration of French armies on many a battlefield. The keynote of the 'Marseillaise' is in the final stanza (the sixth):

Oh love of fatherland supernal,
Our avenging arms direct, sustain!
Oh Liberty, divine, eternal,
Fight by thy champions' side amain!
Beneath our gallant banner gory,
May victory hasten at thy call,
And thine opponents, as they fall,
Behold thy triumph and our glory!

The national hymn of the Second Empire (1852–70) was 'Partant pour la Syrie'; words by A. de Laborde and music by Queen Hortense.

Great Britain.— The British national hymn, 'God Save the King,' was composed in 1739 by Henry Carey (1692–1743), who was partly indebted to others for the words. He borrowed and re-wrote the air from the French. The music has been adopted for the national hymns of the United States, Switzerland, Prussia, and other German states. The Welsh national song, 'Hen Wlad Fy Nhadan' (Land of my Fathers), was written by Evan James; melody by James James. The first stanza, as translated by Eben Vardd, is as follows:

The land of my fathers, the land of my choice,
The land in which poets and minstrels rejoice;
The land whose stern warriors were true to the core,
While bleeding for freedom of yore.

Among the patriotic songs of various parts of the British Empire are 'The Song of Australia' (words by Mrs. C. J. Carleton and music by Carl Linger) and Canada's 'Maple-leaf Forever' (music by A. Muir).

Germany.— Germany's national hymn, 'Die Wacht am Rhein' (The Watch on the Rhine), was written in 1840 by Max Schneckenburger (1819–49). The air, composed in 1854 by Carl Wilhelm (1815–75), was little known until the Franco-Prussian war (1870–1), when this stirring lyric sprang into sudden popularity.

A national song very popular among Germans is 'Deutschland über Alles,' written in 1841 by August H. Hoffmann (1798–1874), generally known as Hoffmann von Fallersleben. It is sung to the music of the Austrian national hymn. The first stanza of 'Das Lied der Deutschen' is thus translated:

German Empire over all things, over all things in the world,
When for safety and defiance its proud banner is unfurled,
From the Maas unto the Memel, from the Etsch to sea waves curled —
German Empire over all things, over all things in the world!

Prussia.— The Prussian national hymn is 'Heil dir im Siegerkranz' (Hail to thee laurel-crowned), written in 1790 by Heinrich Harries (1762–1802). It is sung to the tune of 'God Save the King.' A general favorite is 'Preussenlied' (Song of the Prussians), written in 1830 by Bernhard Thiersch (1794–1855); melody composed in 1839 by H. A. Neithardt (1793–1861). The Bavarian hymn is 'Heil unserm König, Heil' (Hail to our monarch, hail).

Switzerland.— The Swiss national hymn, 'Dem Vaterland' (My Fatherland), by J. R. Wyss (1781–1830), is sung to Carey's music. The first stanza of this inspiring lyric is:

Call'st thou, my Fatherland?
See us with heart and hand
Vowed to thee, all!
Helvetia, hail to thee!
True still thy sons shall be,
Like them Saint James did see
Leap at war's call!

Netherlands.— Holland has two national songs that are often sung on public occasions — 'Wilhelmus van Nassouwe' (dating back to 1583) and 'Wien Neerlandsch Bloed.' The latter hymn, by H. C. Tollens (1778–1856), begins:

Let him in whom old Dutch blood flows,
Untainted, free and strong;
Whose heart for Prince and country glows,
Now join us in our song;
Let him with us lift up his voice,
And sing in patriot band,
The song at which all hearts rejoice,
For Prince and Fatherland!

The writer of the Boer national hymn is not known. The music is attributed to the Dutch composer, Richard Holl. There are three stanzas, of which the first runs as follows:

Know'st thou a race, of freemen bred,
Who broke the tyrant's might;
Who burst their bonds and fought and bled
For freedom and for right?
Come, burghers! Raise the flag on high
That led to victory;
The hour of bondage has gone by —
Free men, free men are we!

There are two stanzas in the national hymn of the Orange Free State; words by H. A. L. Hammelsberg and music by W. F. G. Nicolai.

Denmark.— The Danish national hymn, 'Kong Christian stod ved höjen mast' (King Christian stood beside the mast), was written by Johannes Evald (1743–81); music by Johan Hartmann (d. 1793), a German who settled in Copenhagen in 1768. Longfellow's version of this spirited poem is well known.

Norway.— The Norwegian national hymn is 'Sang for Norge' (Song for Norway), written in 1859 by Björnstjerne Björnson. Three

stanzas of this admirable lyric have been translated by Rasmus B. Anderson. The first is:

Yes, we love with fond devotion
Norway's mountain domes,
Rising, storm-lashed, o'er the ocean,
With their thousand homes;
Love our country, while we're bending
Thoughts to fathers grand,
And to saga-night that's sending
Dreams upon our land.

Another patriotic song is Anker Minding's 'Sönner af Norge' (Sons of Norway), set to music by H. A. Bjerregaard (1792–1842).

Sweden.— The Swedish national hymn is 'Fosterjorden' (Land of my Birth), by Richard Dybeck (1811–77); melody from Jemtland (a province in western Sweden) arranged by J. N. Ahlstrom. C. T. Hanson's translation is:

Oh, ancient beloved Northland of my birth,
The happiest of nations though lowly,
I greet thee, most beauteous land upon earth,
Thy green hills, thy sun, thy heaven blue and holy.

The thought of thee brings back the days that are gone,
The same in thy royal beauty ever,
O'er all lands and seas thy sweet name is borne,
Oh, I would live among thy hills forever!

Russia.— The national hymn of Finland, 'Värt Land' (Our Land), by J. L. Runeberg (1804–77), is one of marked beauty; music by F. Pacius. The Russian national hymn, 'Bozhe Zaria Chrany' (God preserve the Tzar), written by Joukowsky, is a prayer. The air by Alexis Lvoff dates from 1830, when Nicholas I. ordered it sung as the national anthem. The revolt of 1830 produced the stirring battle song by Albert Sowinski, 'Poland's not yet dead in slavery,' which has been called the Polish national hymn.

Rumania and Servia.— The Balkan states have national songs that are highly characteristic of these liberty-loving peoples. That of Montenegro is 'Onward! Onward!' Servia has two: 'Rise, Servians'; and 'God in His Goodness,' set to music by D. Jenko. In 1861 the Rumanian government offered a prize for the best national hymn, which was won by V. Alexandri's stanzas, 'Long live the king'; music by E. A. Hübsch.

Turkey.— Turkey has no national hymn. Each sultan has an imperial air composed in his honor. That of Abdul Hamid, 'Hamidie,' was written by Hadji Emin Bey; music by Redgeb Pacha. There are several Ottoman war songs full of national feeling.

Greece.— The Greek national hymn is the war song, 'Sons of Greece, come, arise,' which dates back to the days of the Greek struggle for independence (1821–9). Byron translated it.

Italy.— The only national air of Italy is Gabetti's 'Marcia Reale Italiana' (Royal Italian March), played on all official occasions. The famed Garibaldi's 'Hymn' is a martial strain, and the other patriotic songs are sectional.

Spain.— The Spanish national air is the fine 'Hymne de Riejo,' by Huerta (1803–80).

Portugal.— Portugal's national hymn is the 'Hymno Constitucional,' written about 1861 by Dom Pedro I., emperor of Brazil. Upon the accession of Don Carlos I. (21 Dec. 1889), a new national air was composed by H. M. Jurior.

United States.— The national anthem of the United States is the 'Star Spangled Banner,' written in 1814 by Francis S. Key. The melody is that of an old drinking song. Other patriotic songs that divide honors with it are: 'Hail, Columbia' (1798), by Joseph Hopkinson (1770–1842), sung to music composed by Fyles in 1788; and S. F. Smith's 'America,' written in 1832 to fit the air of 'God Save the King.'

Mexico.— The Mexican national hymn, 'Mexicanos, al grito de guerra' (Mexicans, at the cry of war), was written by F. G. Bocanegra; air composed in 1853 by James Nunó.

South and Central America.— The national hymns of other countries of Spanish America are: Costa Rica — 'De la Patria,' by M. M. Gutierrez; Guatemala — words by P. Molina and air by R. Alvarez; Honduras — music by L. Campos; Nicaragua — air by Blas Villatas; Salvador — words by J. J. Canas and music by J. Aberle; Argentina — air by V. Lopez; Brazil — words by Medeiros e Albuquerque and music by L. Miquez; Chile — air by Carnicer; Bolivia — words by J. I. de Sanjines and music by B. Vincenti; Uruguay — music by D. I. Deballi; Venezuela — words by V. Salias and music by J. Sandaeta.

Oriental.— The airs that do duty as national hymns in Persia, Burma, and other Oriental countries are not very elaborate. That of Japan consists of four lines:

Let Mikado's empire stand
Till a thousand years, ten thousand years shall roll,
Till the sand in the brooklets grow to stone,
And the moss these pebbles emeralds make.

The Japanese have borrowed G. F. Root's 'Battle Cry of Freedom.' Some Mohammedan countries of Africa have sultans' hymns. The national air of Liberia is by Olmstead Luca.

Consult: Smith, 'Music of the Waters'; Smith, 'Stories of Great National Songs'; Fitzgerald, 'Stories of Famous Songs'; Sousa, 'Airs of All Lands'; Kappey, 'Songs of Eastern Europe'; Engel, 'Study of National Music'; White, 'National Hymns.' EUGENE PARSONS.

National Law. See INTERNATIONAL LAW.

National Legislative Assembly, in French history, when the nobility and clergy summoned with the Tiers Etat ("Third Estate") to the States-General declined to sit with the Commons, these declaring, on 17 June 1789, that they represented 96 per cent of the nation, assumed the name of the National Legislative Assembly, though the name Constituent Assembly is more frequently employed. The second assembly convened from 1 Oct. 1791 to 21 Sept. 1792, and was followed by the National Convention. Its composition was democratic.

National Museum. See UNITED STATES NATIONAL MUSEUM.

National Nicknames, the collective name of a people or nation, usually originating with the people themselves. John Bull was first given to the people of Great Britain by John Arbuthnot in his 'Law is a Bottomless Pit.' He also gave the name Nicholas Frog to the Dutch and Jean Crapaud (toad) to the French people. John Chinaman is a popular name for the Chinese, Taffy for the Welsh; Jean Baptiste for the French Canadians, and Ivan Ivanovitch for the Russians.

In the United States the two popular national names are Brother Jonathan and Uncle Sam. The former was first used. Gen. Washington, on assuming command of the New England Revolutionary forces, was in great straits for arms and war material. The governor of Connecticut, Jonathan Trumbull, was a man of excellent judgment and an esteemed friend of Washington. In the emergency, Washington

said, "We must consult Brother Jonathan." This expression was repeated on other difficult occasions, and became a convenient name for the whole people. The name Uncle Sam is an extension of the letters U. S. (United States), printed or stamped on the government property. It was first used in Troy, N. Y., in 1812, when certain goods purchased for the government and branded U. S., were officially inspected by Samuel Wilson, whose nickname was "Uncle Sam." The coincidence of initials suggested the application of this nickname to the government.

National Parks and Reservations, large tracts of public lands in the United States, reserved from settlement or residence, and which are retained, maintained, and improved by the Federal Government. These public parks include the Casa Grande Park in Arizona, 480 acres; the Yellowstone National Park in Montana and Wyoming, 2,142,720 acres; the Sequoia Park in California, 250 square miles; the Hot Springs Reservation, 912 acres; Yosemite National Park, in California, 1,512 square miles; General Grant Park in California, 4 square miles; and others. A detailed description of these National parks will be found under their respective titles. For a list of United States military reservations see MILITARY POSTS, UNITED STATES.

National Portrait Gallery, British, an institution that owes its origin to the zealous and enlightened efforts of Earl Stanhope. A board of trustees was appointed late in 1856, and by the end of the following year 23 portraits had been secured — some of them purchases and others gifts. The difficulty of the trustees is to guard against improper admissions in the way of donation, and therefore no donation can be accepted unless approved of by at least three-fourths of the trustees present at a meeting. At present the National Portrait Gallery contains over 1,000 portraits, under the varieties of paintings, busts, medallions, etc. Its treasures were for a time accommodated in the Bethnal Green Museum, but a new building, erected for it mainly by private munificence (funds being provided by W. H. Alexander), beside the National Gallery, was opened in 1896. The arrangement is chronological.

National Provident Union, an American fraternal society founded in 1883. In 1903 it had 54 sub-councils and 3,117 members. Its headquarters are in Brooklyn, N. Y. During 1902 it disbursed $100,892 in benefits.

National Republican Party, in American history, the name taken by those who deserted the old Democratic-Republican party after the defeat of Adams by Jackson in 1828. Clay was defeated. In 1835 the party, reinforced by other elements, took the name of Whig. See WHIG PARTY.

National Road. See ROADS AND ROADWAYS.

National Soldiers' Homes. See SOLDIERS' HOMES.

National Songs, popular melodies or tunes with accompanying words, peculiar to a particular nation or people. These songs are sung and the melodies played on state or public occasions, and are frequently utilized in war as battle songs. In the United States, 'The Star Spangled Banner,' 'Yankee Doodle,' 'Hail Columbia,' 'America,' 'John Brown's Body,' and 'Dixie' are popular national songs. It is generally conceded that 'Yankee Doodle' is the true national American air, notwithstanding the more recent rival claims of 'Hail Columbia' and 'The Star Spangled Banner,' neither of which have high intrinsic merit or have taken any great popular hold. More like a hymn is the song 'America,' which is sung to the tune of 'God Save the King.' The origin of 'Yankee Doodle' is obscure and disputed. The most probable account ascribes to the tune an English origin, and the words to Dr. Schuckburgh, an army surgeon, about 1755, soon after which, during the American Revolution, it came extensively into vogue.

The origin of the British national anthem has been a subject of controversy since the end of the 18th century, and is still involved in obscurity. 'God Save the King' was first printed in the 'Harmonia Anglicana' of 1742, without name of author or composer, varying slightly from the present version; and in 1745, during the Scottish rebellion, it became widely known, versions of it being sung nightly at Drury Lane and Covent Garden theatres with great applause. Of the numerous claims to its parentage, the view supported by most, and by several eminent writers, attributes it, both words and music, to Henry Carey, about 1740. The evidence for this is given in Chappell's 'Popular Music of the Olden Time,' and Chrysander's 'Jahrbücher,' Vol. I. But W. H. Cummings, who thoroughly beat out the subject in a series of papers in the 'Musical Times' in 1878, entitled to the greatest weight, considers this evidence unreliable; and he arrives at the conclusion that the music has been adopted (but when, and by whom, we shall probably never know) from an "Ayre" by Dr. John Bull, found (without words) in a collection of music by him once in the hands of Dr. Kitchener, afterward of Richard Clark, the original of which seems to have disappeared.

The hymn was translated into German by Heinrich Harries, a Holstein clergyman, and sung to the original air at a birthday celebration in honor of the king of Denmark in 1790; and an adaptation from these words, made in 1793 by Dr. B. G. Schumacher, beginning "Heil dir im Siegerkranz," has ever since been in use as the Prussian national hymn. It called forth the admiration of Beethoven and Haydn, and moved the latter to compose the Austrian national hymn, which was first sung on the Emperor Franz's birthday in 1797. The words now used, beginning, "Gott erhalte Franz den Kaiser," are by Baron Zedlitz; the original words were by Hauschka. The Hungarians have two national hymns — the 'Szózat' ('The Appeal'), beginning, "Be true to the land of thy birth," written by Vörösmarty (1800–55), the creator of Hungarian poetry of the Romantic school, and composed by Benjamin Egressy, an actor and eminent composer of sacred music; and the 'Magyar Hymnusz,' written by Kölcsey and composed by Francis Erkel. The Rákóczy march, by an unknown composer, dates from the end of the 17th century. The simple and dignified Russian national anthem dates from 1830, and is the work of General Alexis Lwoff (1799–1870). Of the Danish national hymn, 'Kong Christian,' the words are by Ewald and the music by Johann Ernst Hartmann (1726–91). There are several claimants to the honor of

being the Norwegian national hymn, of which may be mentioned 'Sönner af Norge,' written about the beginning of the 19th century, music by C. Blom; and the modern 'Ja, vi elsker dette Landet' ('Yes, we love this land'), words by Björnson, music by R. Nordraak. The Swedish hymn, 'King Karl, the Young Hero,' was written by Esaias Tegnér (1782–1846). The Dutch national hymn, 'Wien Neerlandsch Bloed,' was written by Henrik Tollens (1780–1856), and was composed by J. W. Wilms. 'La Brabanconne,' the Belgian revolutionary song of 1830, was written by Jenneval, a Brussels actor, and composed by Campenhout. The 'Marseillaise' (q.v.) of the French was written and composed in 1792 by Claude Joseph Rouget de Lisle (1760–1836), and received its name from being sung by the volunteers from Marseilles who took part in the movements in Paris in that year. Various doubts have been thrown on De Lisle's authorship of the tune, but these were finally disposed of by a pamphlet written by his nephew in 1865. The Portuguese 'Hymno Constitucional' was composed by Dom Pedro I., emperor of Brazil.

National Union, an American fraternal and beneficial organization, incorporated in 1881, under the laws of Ohio. In 1903 there were 875 councils and 63,000 members in the Order. Over $150,000,000 in insurance is carried by the members, and over $15,000,000 has been paid out in death benefits. The headquarters of the Order are located at Toledo, Ohio.

National University, The, a proposed great institution of learning to be located at Washington, D. C. For over 100 years there has been discussion of this subject. The establishment of such a university was first conceived by George Washington about 1790, when the shares he received from the Potomac Company had proved so valuable. He wished to appropriate this stock toward the founding of such an institution, but this stock, and that accruing from the James River Company left by his will for such purposes, were, however, divided between two charity schools, one on the James (see WASHINGTON AND LEE UNIVERSITY), and one on the Potomac. Washington strongly disapproved of foreign education for the American youth.

A national university, known as the Carnegie Institute, was incorporated 4 Jan. 1902 in Washington, D. C., by John Hay, Secretary of State; Edwin D. White, Justice of the Supreme Court; D. C. Gilman, ex-president of Johns Hopkins University; Charles D. Walcott, superintendent of the Geological Survey; John S. Billings, ex-Surgeon-General of the Navy, and Carroll D. Wright, Commissioner of Labor. The aims of the university are: (1) To increase the efficiency of the universities and other institutions of learning throughout the country by utilizing and adding to their existing facilities, and by aiding teachers in the various institutions for experimental and other work in these institutions as far as may be advisable. (2) To discover the exceptional man in every department of study, whenever and wherever found, and enable him by financial aid to make the work for which he seems specially designed his life work. (3) To promote original research, paying great attention thereto, as being one of the chief purposes of this institution. (4) To increase the facilities for higher education. (5) To enable such students as may find Washington the best point for their special studies to avail themselves of such advantages as may be open to them in the museums, libraries, laboratories, observatory, meteorological, piscicultural, and forestry schools and kindred institutions of the several departments of the government. (6) To ensure the prompt publication and distribution of the results of scientific investigation, a field considered to be highly important.

The board of trustees elected by the corporators of the institution included the President of the United States, the president of the United States Senate, the speaker of the House of Representatives, the secretary of the Smithsonian Institution, the president of the National Academy of Sciences, and 20 other leading citizens of the United States. The establishment of the National University was made possible by the gift, for this purpose, of $10,000,000 by Andrew Carnegie (q.v.). In 1903 no actual steps had as yet been taken toward the construction of university buildings.

National Workshops. See ATELIERS NATIONAUX.

Nationalism, a system of socialism having its origin in Edward Bellamy's novel of social reform, 'Looking Backward.' In 1889 a party of Bellamy's admirers in Boston organized the first Nationalistic Association, and in 1901 the movement had spread so rapidly that nearly 200 similar clubs had been organized. In certain localities, particularly in California, these clubs took an active interest in politics. The movement also spread to England, where the Nationalization Society was organized in 1890. Bellamy's scheme involved government control of production and distribution. Consult Bellamy, 'Looking Backward' (1887).

Nationalists, in British politics, a term applied to the Irish political party whose programme includes the more or less complete separation of Ireland from Great Britain.

Nationality, in the United States is determined by the Federal law. The Constitution established no rules regarding the acquisition or loss of American nationality, which is therefore governed by the subsidiary or common law of the land. See FOURTEENTH AMENDMENT; GOVERNMENT; NATURALIZATION.

Nations, Battle of the ("Völkerschlacht"), in the Napoleonic wars, the battle fought at Leipsic 16–19 Oct. 1813, in which Napoleon, with about 190,000 men, was defeated by the allies numbering from 200,000 to over 300,000 at different stages of the conflict. The French loss is estimated at 40,000 killed and wounded, and 30,000 prisoners; that of the allies at 54,000 killed and wounded. The liberation of Germany is practically dated from this event.

Nations, Law of. See INTERNATIONAL LAW.

Native Bear, the Australian koala (q.v.).

Native Companion, an Australian name for a large local crane (*Grus australasiana*) peculiar to that island-continent.

Nativ'ity, in astrology, the theme or figure of the heavens, and particularly of the 12 houses, at the moment when a person is born, supposed to indicate his future destinies, and

synonymous with horoscope. See HOROSCOPE; ASTROLOGY.

Nato'lia, or **Anato'lia,** the modern name for Asia Minor (q.v.).

Natorp, nä'tôrp, **Paul Gerhard,** German scholar: b. Düsseldorf, Germany, 24 Jan. 1854. He was educated in Berlin, Bonn, and Strasburg and accepted a professorship in Marburg in 1885. He wrote: 'Descartes' Erkenntnisstheorie' (1882); 'Platos Staat' (1895); 'Platos Ideenlehre' (1903); etc.

Natrocal'cite. See GAY-LUSSITE.

Nat'rolite (from "natron," native carbonate of sodium), a native hydrous silicate of sodium and aluminum, having the chemical formula $Na_2Al_2Si_3O_{10} + 2H_2O$, and crystallizing in slender prismatic forms belonging to the orthorhombic system. It is transparent to translucent, and usually white (or nearly so), with a vitreous lustre, a hardness of from 5 to 5.5, and a specific gravity of from 2.20 to 2.25. It occurs in cavities in basaltic rocks, and in seams in granite, gneiss and syenite. It occurs in many parts of Europe, and fine crystals are found in southern Norway. In the United States the mineral occurs in Connecticut, New Jersey, and Arkansas, and also in the Lake Superior region. It is likewise found in Nova Scotia. Natrolite takes a good polish, and has been used as a gem stone.

Na'tron, a carbonate of soda or mineral alkali, $Na_2CO_3 10H_2O$. It is produced from the ashes of several species of marine plants, and is also obtained by evaporating the waters from some mineral springs. It occurs in nature, but only in solution, and is generally found in an impure state, being mixed with other sodium salts, such as the sulphate and chloride. The soda lakes of Egypt have supplied great quantities of this substance for many centuries; it was used by the ancient Egyptians as an important ingredient in their embalming fluids. A similar but impure hydrogen sodium carbonate is found deposited by evaporation on the shores of the Caspian and Black seas, also on the banks of alkali lakes and springs in California, particularly in the neighborhood of San Bernardino.

Natter, Heinrich, Austrian sculptor: b. Graun, Tyrol, 16 March 1846; d. Vienna 13 April 1892. He was five years apprentice to a sculptor in Meran and subsequently was taught drawing at Augsburg by Johann Geyer, a famous painter of humorous genre. Subsequently he studied with great profit under Max Widumann (q.v.), the sculptor, in the Munich academy. Weak health compelled him to travel and he visited Riva on Lago de Garda, and Venice, until the war of 1866 called him to active military service. He afterward took up his residence at Munich, where he made his reputation by his portrait busts, sepulchral statues, a colossal statue of the god 'Odin' (1873) and the head of a 'Sleeping Satyr.' A career of wider activity opened for him after his settlement in Vienna, where, besides numerous bust portraits and monuments he executed the statue of Zwingli for Zürich; the statue of Haydn for Vienna; the portrait statue of Laube and Dingelstedt for the municipal theatre of that city; and the statue of Walter von der Vogelweide for Bolzano (1889). His statue of Andreas Hofer, which is his masterpiece, was unveiled after the sculptor's death on a height near Innsbruck. A poetic delicacy of conception and a certain life-like expression, oftener found in painting than in sculpture, are the characteristic features of his work. His literary remains were published by L. Speidel, under the title 'Kleine Schriften' (1893).

Nat'terjack, an Old World toad (*Bufo calamita*), light-brown in color, spotted with patches of a darker hue. It does not leap or crawl like the common toad, but rather runs, whence it has the name of walking or running toad. It has a deep and hollow voice, audible at a great distance, and is often found in dry situations.

Nattier, Jean Marc, zhŏn märk nä-tē-ā, French painter: b. Paris 1685; d. 1766. He was the pupil of Jean Jouvenet, won the Academy prize in 1700 and became professor of the Academy in 1752. His fame as a portrait painter was increased by the visit he paid to Antwerp in 1715 to paint likenesses of Peter the Great and his wife Katharine I.; he also painted the portraits of many of their suite. So great was his skill in portraying the fine ladies of his day that he has done as much to immortalize such faces as those of Marie Lesczynska, Henriette de France, Madame Adelaide, Madame de Chateauroux, Madame de Flavacourt, and many others of the court of Louis XV., as Rigaud (see RIGAUD, HYACINTHE) had done for Bossuet, for Louis XIV., his courtiers, and other leading men of the period.

Natty Bumppo, the central figure in Cooper's (see COOPER, J. F.) stories: 'The Pioneers' (1823), in which he appears as "Leatherstocking," a name lent to the series as the 'Leatherstocking Tales'; 'The Last of the Mohicans' (1826), in which he is known as "Hawk-eye" and "Le Longue Carabine" ("The Long Rifle"); and 'The Pathfinder' (1840) and 'The Deerslayer' (1841), in which his respective sobriquets furnish the titles of the volumes. Lounsbury ('Life' of Cooper 1884) has called him "one of the few original characters, perhaps the only great original character, that American fiction has added to the literature of the world."

Natuna (nä too'nä) **Islands,** East Indies, a chain of islands in the South China Sea, extending northwest from Cape Api, Borneo, and belonging to the Dutch. The principal islands are Great and South Natuna islands, and Stokong. The aggregate area is estimated at over 800 square miles. The islands are mountainous and densely forested; the chief products are cocoanuts, fish, rice, and maize. Pop. 9,000, mostly Malay fishermen.

Natural (in music). See MUSIC.

Natural Bridges are formation tunnels eaten through rocks by streams, etc. There are many of these natural curiosities in the United States. The one in Virginia is the most celebrated. The arch is 60 feet spring, depth 200 feet, crown 40 feet thick. In Walker County, Ala., is a natural bridge in which the stone is so stratified as to resemble masonry. In Trinity County, Cal., a small river runs for 3,000 feet through an arch of 80 feet span and 20 feet high. In Berkshire County, Mass., the Hudson brook flows for 30 rods under an arch of white

marble. At the village of Natural Bridge, N. Y., the Indian River flows through a series of arches.

Natural Gas. See GAS, NATURAL.

Natural History, in its widest sense, that department of knowledge which comprehends the sciences of zoology and botany, chemistry, natural philosophy or physics, geology, palæontology, and mineralogy. It is now, however, commonly used to denote collectively the sciences of botany and zoology, and it is sometimes restricted to denote the science of zoology alone.

Natural History of Selborne, The, a celebrated work by Gilbert White (q.v.), published in 1789. Its material consists of White's letters to Daines Barrington and Thomas Pennant (qq.v.), in which the writer describes outdoor life in the little Hampshire village which his works made famous and interesting alike to students of nature and to lovers of good books, among which the 'Natural History' ranks as a unique classic of science and of letters.

Natural Law. See LAW, NATURAL.

Natural Philosophy. See PHYSICS.

Natural Rights. See LAW, NATURAL.

Natural Selection, the doctrine advanced by Charles Darwin and almost coincidentally by Alfred Russel Wallace (q.v.), to account for the divergence of animal forms and their gradual separation into distinct species and groups, by a process akin to the selective mating practised by men in rearing and perpetuating breeds of domestic animals. It forms the basis of Darwin's hypothesis of organic development by descent, and depends upon the fact that variations constantly appear in animals, and may in some degree be perpetuated. These variations may be minute fluctuations on either side of a mean, a little more of one character and a little less of another; or they may be sudden steps of considerable magnitude; in other words, they may be continuous or discontinuous. They may visibly affect only one character at a time, or they may affect many parts of the organism at once, as if there were a general movement to a new position of organic equilibrium.

(2) Living creatures are involved in a manifold and intricate struggle for existence, varying greatly in its form and in its intensity, and due to a variety of causes. It is necessitated especially by two facts: first, that two parents usually produce many more than a pair of offspring, and that the population tends to outrun the means of subsistence; and, secondly, that organisms are at the best only relatively well adapted to the external conditions of their life, which moreover are variable. The «struggle» may be for food or foothold, for mates or property, for self-preservation or for the welfare of the young, including much more than an internecine scramble around the platter which contains the necessaries of life; the phrase is applicable as regards relative length of life, vigor or constitution, success in having offspring, and so on.

(3) In this struggle for existence the relatively less fit organisms are weeded out or eliminated, and sometimes only a small proportion of those born survive to become adults or reproductive. But it must be clearly understood that elimination does not necessarily involve sudden death or no offspring; it may simply involve, in the first instance, a slightly shorter, less successful life, or a smaller, less vigorous family. Yet whether the eliminative process be gentle or severe, the result is the same — that the relatively more fit variants tend to survive; and since many variations are demonstrably transmissible from generation to generation, and may, through the pairing of similar or suitable mates, or in other ways, gradually increase in amount, the eliminative or selective process works toward the establishment of new adaptations and new species.

The three steps in the argument are thus: (1) The occurrence of transmissible germinal variations is a fact of life; (2) the struggle for existence is a fact of life; and (3) the elimination of the relatively less fit is a fact of life. The result has been, and is, the rise and progress of new adaptations, new varieties, new species, new types.

A formidable objection to the selection theory, first clearly stated by Prof. Fleeming Jenkin, is that variations of small amount and sparse occurrence would tend to be swamped out by intercrossing. In human or «artificial» selection, the breeder takes measures to prevent this by pairing similar or suitable forms, but what in nature corresponds to this action of the breeder? Various suggestions have been made in answer to this objection. Thus Weismann says: «The necessary variations from which transformations arise must in all cases be exhibited, over and over again, by many individuals,» and in his ingenious theory of Germinal Selection he has suggested the internal mechanism by which this result may come about.

But the answer at present most relied on is that worked out by Romanes, Gulick, and others — the theory of isolation (q.v.). The theory of isolation emphasizes the great variety of ways in which, in the ordinary course of nature, the range of intercrossing may be restricted, for example, by geographical barriers, by differences in habit, by psychical likes and dislikes, and by those remarkable reproductive variations which cause mutual sterility between two sections of a species living on a common area.

We have given a statement of the theory of natural selection very much as it might have been given in 1859, when Charles Darwin and Alfred Russel Wallace enriched biology by their independent exposition of the selection idea; but since then our knowledge of the nature and origin of variations has greatly increased, the analysis of the various modes of inheritance has become much more precise, the difficulty of proving any instance of the transmission of «an acquired character» or direct somatic modification is generally acknowledged, and we have recognized the value of a second directive factor in evolution, namely, isolation. It may be said that the theory of natural selection is now being subjected to more severe and more dispassionate criticism than it had to encounter in the early Darwinian days, when the validity of the general evolution idea was the central subject of discussion.

Thus there is a demand for some serious attempt to measure the intensity of the struggle for existence in typical cases, and for evidence that the absence of a particular variation in certain members of a stock does really determine their elimination. In other words, evolutionists have awakened to the necessity of testing natural selection in relation to actual cases.

Lastly it should be noted that the doctrines of Lamarck, which were that use-and-disuse, inheritance of acquired characters, and other factors were more potent than natural selection, have been revived and strengthened by a school of naturalists who insist that they must at least be held to have had an important share in the phenomena of biology.

Bibliography.—Darwin, 'Origin of Species' (6th edition, 1882); 'Descent of Man' and other works; Wallace, 'Natural Selection' (1869; revised edition 1891) 'Darwinism' (1889); Huxley, 'Lectures on Evolution' and other works; Gray, 'Darwiniana' (1876); Weismann, 'Essays upon Heredity' (1892) and other works; Romanes, 'Darwin and After Darwin' (1892–5); Osborn, 'From the Greeks to Darwin' (1894), and the writings of Allen, Bates, Bateson, Beddard, Belt, Brooks, Cope, Forbes, Gadow, Haeckel, Hyatt, Lankester, Morgan, Packard, Poulton, Semper, and modern zoologists generally. See DARWINIAN THEORY; EVOLUTION.

Natural Theology, that knowledge of God's existence and nature which mankind learn from observation of the world of nature. Biblical theology is the knowledge of God's nature and operations derived from revelation; and revelation is impossible unless we first postulate a personal God. Thus natural theology is the foundation of any system which professes to give an account of the Supreme Being as well as of man's origin and destiny.

Method of Natural Theology.—The first proposition postulated in this department of speculation is that every effect requires a cause (q.v.). One of the self-contradictions of Lucretius is contained in his axiom *ex nihilo nihil fit* ("nothing can come from nothing"), after pronouncing which he proceeds in his attempt to prove that the order and uniformity of nature proceeds from nothing, that is, random disorder, the fortuitous concourse of atoms. Unless it is admitted that certain events and phenomena are invariably connected as cause and effect, there can be no science of Natural Theology, which is based upon the assumption that causation is a fact, the truth of which is accepted among the intuitive beliefs of the human mind.

How far a Science.—As Natural Theology claims for its domain the physical, intellectual and moral nature of man as well as the world of nature in the midst of which he is set, it starts out by saying with Natural Science that the present constitution of things had a beginning. Plants and animals did not always exist on this planet. The questions arise, Whence did they come? How came man here? The theory that species as it exists at present was the original form of organic life on the earth, has now been abandoned, and two other theories have come in sight, (1) That animals and plants have been produced by forces eternally and necessarily inherent in matter (see NATURALISM). (2) That nature is the product of a personal being, acting with deliberate design. In the history of recent speculation we come upon a suspensive judgment in this question; on the other hand Positivists (see POSITIVISM) have ruled it out from the field of human speculation. Suspensive reasoners do not profess to know because they declare the matter unknowable. This is agnosticism (q.v.) and its adherents style themselves agnostics.. On the other hand, observers of nature have remarked in the works of nature an analogy with and a resemblance to the works, contrivances and methods of human artificers. They have accordingly reached a belief in a transcendently great and powerful maker who has originated all things. The existence of man as an individual person has been taken as testimony to the existence of an infinite and eternal being as the one supreme God. It has also been averred that anti-intuitionalists destroy the basis of all knowledge and science and that a physicist who denies causation sweeps away the foundation on which his system is reared.

Main Arguments.—(1) It is claimed that the idea of God's existence is innate in every human being and is as necessary a fact of consciousness as his own personal identity. In the most rudimentary and debased tribes is found this sense of a Supernatural Power. Lubbock and others deny to some degraded races this innate idea; it is sometimes added that deaf-mutes are in the same mental condition. It does not, however, follow because an idea has not been expressed in language that it is therefore not present in the mind. The mind may not have been explored by the subject; the readiness with which belief in the supernatural is accepted by savages and children is one reason for the belief that the response they make to communications on this subject springs from previous divinations of the consciousness in realizing itself. If this idea is not innate it is certain that the faculties of the human mind are such that the study of nature, man, and the obligations of life bring each individual face to face with the notion of God. Descartes, Leibnitz and others aver that the capacity of the human mind to entertain the conception of a being perfect and omnipotent, proves the existence of a reality which corresponds to such a conception; but their argument has not satisfied metaphysicians such as Reid and Stewart and, through the metaphysical subtilities involved in it, must be laid aside as a popular argument. (1) The study of nature and of history, that is, of man as a physical intellectual and moral being, furnishes material for arguments from design, teleological arguments as they are sometimes called (see TELEOLOGY). This is the simplest and most obvious form of argument to be put forth in Natural Theology and has been put forth in all ages. Socrates constantly stated it; Cicero enforced it among his Roman followers. Although on the first publication of Darwin's and Wallace's theory of evolution it lost its place of importance in Apologetics, it has recently been revived and stated with renewed force. The laws of Natural Selection and Survival of the Fittest must have had a law-giver, and the discovery of additional links in the chain of causation does not necessarily destroy its continuity. The Hebrew writers constantly refer to the power and goodness of Jehovah as evidences both in the works of nature, the events of history and the faculties of mankind. Saint Paul begins his Epistle to the Romans with this argument against the degraded paganism of Rome; the Fathers have enforced it over and over again. Paley's 'Natural Theology' has been a most important statement of the argument from design which has been enlarged in its application by Chalmers, Tulloch, McCosh and Agassiz. The argument from design can of course only prove the existence of a creator of

the world. Man alone is conscious of a Creator, who, however, need not be the self-existent God, but once grant that man has a maker, and it would at once follow that a supreme self-existent God exists who is the First Cause. Consult: Xenophon, 'Memorabilia'; Plato, 'Laws X.'; Cicero, 'De Natura Deorum'; Descartes, 'Principia Philosophiæ'; Leibnitz, 'Theodice'; Paley, 'Natural Theology'; Chalmers, 'Natural Theology'; McCosh and Dickie, 'Typical Forms in Nature'; Tulloch, 'Theism'; Chadbourne, 'Final Causes'; Harris, 'Philosophical Basis of Theism.'

Natural Tones are tones produced by the natural alteration of nodal points in wind instruments by pressure only. See HARMONICS.

Nat'uralism, the theory that in the operations of nature a blind force acts in accordance with necessary law. In ancient Greek philosophy naturalism was taught by Leucippus and by Epicurus in their atomic theory of the universe. The most famous exposition of this doctrine is to be found in the 'De Rerum Natura' or 'Nature' of Lucretius (q.v.) the Latin poet contemporary with Cicero. In modern times it has been advocated by D'Holbach, in his 'Système de la Nature'; Robinet in his 'Traité de la Nature,' and it sometimes seems as if Herbert Spencer, in his 'First Principles,' taught it; though in the latter days of his life he wavered and vacillated very much in his ideas of causation. In theology naturalism is opposed to Theism, in that it implies the non-existence of a personal God as Creator and Controller of the universe. See NATURAL THEOLOGY.

Naturalism (in Literature). See REALISM AND NATURALISM.

Naturalists, American Society of, an association numbering 230 active members, organized in 1883, for the purpose of bringing together persons interested in topics of natural history.

Naturalization Laws, acts placing foreign born persons in the same legal position as natural-born citizens. The conditions under and the manner in which an alien may be admitted to become a citizen of the United States are prescribed by the U. S. Revised Statutes.

Declaration of Intentions.—The alien must declare upon oath before a circuit or district court of the United States or a district or supreme court of the Territories, or a court of record of any of the States having common law jurisdiction and a seal and clerk, two years at least prior to his admission, that it is, *bona fide,* his intention to become a citizen of the United States, and to renounce forever all allegiance and fidelity to any foreign prince or State, and particularly to the one of which he may be at the time a citizen or subject.

Oath on Application for Admission.— He must at the time of his application to be admitted declare on oath, before some one of the courts above specified, "that he will support the Constitution of the United States, and that he absolutely and entirely renounces and adjures all allegiance and fidelity to every foreign prince, potentate, state, or sovereignty, and particularly. by name, to the prince, potentate, state, or sovereignty of which he was before a citizen or subject," which proceedings must be recorded by the clerk of the court.

Conditions for Citizenship.— If it shall appear to the satisfaction of the court to which the alien has applied that he has made a declaration to become a citizen two years before applying for final papers, and has resided continuously within the United States for at least five years, and within the State or Territory where such court is at the time held one year at least; and that during that time "he has behaved as a man of good moral character, attached to the principles of the Constitution of the United States, and well disposed to the good order and happiness of the same," he will be admitted to citizenship.

Titles of Nobility.— If the applicant has borne any hereditary title or order of nobility he must make an express renunciation of the same at the time of his application.

Soldiers.—Any alien of the age of 21 years and upward who has been in the armies of the United States, and has been honorably discharged therefrom, may become a citizen on his petition, without any previous declaration of intention, provided that he has resided in the United States at least one year previous to his application, and is of good moral character. (It is judicially decided that residence of one year in a particular State is not requisite.)

Minors.—Any alien under the age of 21 years who has resided in the United States three years next preceding his arriving at that age, and who has continued to reside therein to the time he may make application to be admitted a citizen thereof, may, after he arrives at the age of 21 years, and after he has resided five years within the United States, including the three years of his minority, be admitted a citizen; but he must make a declaration on oath and prove to the satisfaction of the court that for two years next preceding it has been his *bona fide* intention to become a citizen.

Children of Naturalized Citizens.—The children of persons who have been duly naturalized, being under the age of 21 years at the time of the naturalization of their parents, shall, if dwelling in the United States, be considered as citizens thereof.

Citizens' Children who are Born Abroad.— The children of persons who now are or have been citizens of the United States are, though born out of the limits and jurisdiction of the United States, considered as citizens thereof.

Chinese.—The naturalization of Chinamen is expressly prohibited by the Laws of 1882.

Protection Abroad to Naturalized Citizens.— The Revised Statutes of the United States declare that "all naturalized citizens of the United States while in foreign countries are entitled to and shall receive from this Government the same protection of persons and property which is accorded to native-born citizens."

The Right of Suffrage.—The right to vote comes from the State, and is a State gift. Naturalization is a Federal right and is a gift of the Union, not of any one State. In nearly one half of the Union aliens (who have declared intentions) vote and have the right to vote equally with naturalized or native-born citizens. In the other half only actual citizens may vote. The Federal naturalization laws apply to the whole Union alike, and provide that no alien may be naturalized until after five years' residence. Even after five years' resi-

dence and due naturalization he is not entitled to vote unless the laws of the State confer the privilege upon him, and he may vote in several States six months after landing, if he has declared his intention, under United States law, to become a citizen.

In Other Countries.— In France a foreigner who has obtained permission to become domiciled in France is entitled to letters of declaration of naturalization after three years' residence. Also, by the French Naturalization Act, 1889, a foreigner who has resided in France for 10 years may at once be naturalized without preliminary ceremony. In Germany naturalization can be conferred only by the higher administrative authorities; the applicant must show that he is at liberty, under the laws of his native country, to change his nationality, or, if he is a minor, that his father or guardian has given him the requisite permission, that he is leading a respectable life, that he is domiciled in Germany, and that he has the means of livelihood. In all countries a married woman is held to be a citizen of the state of which her husband is for the time being a subject, and the naturalization of a father carries with it that of his children in minority. In countries where military service is compulsory naturalization in fraud of this either is prohibited or renders the offender liable to imprisonment, if he returns, and forfeiture of all property subsequently acquired in his native country. Certain privileges of British nationality may be acquired by the issue to an alien of letters of denization granted by the crown; and for this no previous residence is required.

Nature Printing, a modern process for obtaining impressions from leaves, fibres, lace, etc. In one method the object, such as a fern frond, is placed between a steel plate and one of heated lead and subjected to a strong pressure, forming an exact intaglio copy in the lead from which impressions are taken.

Nature-study, an educational means of putting the child into direct contact and sympathy with its own life. Education has been largely unrelated to the daily life. The child has lived in one world and has gone to school in another world, and to church in still another. The child lives in a certain environment. The phenomena and objects and portent of this environment should be elucidated to the child to the end that his life may be made meaningful and resourceful at the same time that the intellectual powers are developed and strengthened. In other words, any subject, however common, is capable of being put into pedagogic form and being made the means of training the mind. This is the natural development, as it is natural for the plant to draw its sustenance from the soil and air about it rather than from the soil and air of some other region. The best primary educational means are those that begin with the subjects with which the child lives day by day.

The subjects with which a child lives are «natural» subjects; hence the term «nature-study.» Nature-study has to do with the things and events of the child's customary environment. The term itself is not wholly a fortunate one, since it would seem, in the common use of the word to indicate a «study» or a piece of «work» or a subject for a school «period,» as if it were co-ordinate with geography and writing and English. Nature-study is not merely a subject to be taught: it stands for an attitude toward education and toward living. It stands for open-mindedness and sympathy toward common things and ordinary conditions rather than a mere acquirement of extraneous things. Nature-study teaches in terms of the pupil's life,— the weather, the plants, the animals, the fields, the streets, the affairs of the home and the school and the hamlet or the ward. «Using the common things and events as educational means» is a phrase that expresses the main idea that underlies the term nature-study.

Yet, there is another and vital conception in the nature-study idea: we are to teach by means of the common things for the purpose of putting the pupil into a sympathetic attitude toward his life and environment, not merely to impart knowledge of the things and phenomena themselves. Sympathy is the keynote of nature-study. In this it differs from the traditional teaching of science, and in this it is adapted to the young mind. The customary teaching of science may not open the mind to any sense of loving relationship to its own environment. It may be wholly extrinsic and exotic. Science-teaching has often become as dogmatic and as devoid of the breath of life as mere philosophy or history were in the years just passing. The pupil may not be so near to life and to his own problems when dissecting a necturus as when studying the history of Rome. Both are out of place and out of touch with mere children: they are subjects for later years. «Science,» as commonly taught, is a subject for maturing and mature minds, not for beginners. Nature-study accepts the child's outlook on the world and uses it as a means of developing the child. Gradually, nature-study leads to the science point of view, preparing for the instruction in the advanced grades.

It is not to be supposed, however, that nature-study is unscientific. On the contrary, it should follow the laws of the development of the child's mind, and therefore be eminently scientific. But it is scientific only in itself, and not in the sense that it teaches science, as the word «science» is commonly interpreted in the schools. Science-teaching has for its main purpose the discovery of truth. Its spirit is investigational. It would make investigators. Yet, as a matter of fact, it is as good science to put the child first of all into a correct attitude toward nature as later to develop his research instincts.

It is to be regretted that much of the teaching that passes as nature-study seems to have no permanent pedagogical value. This is almost necessarily the case, since the nature-study movement is new as a matter of practice, however old it may be as a matter of theory and principle. It is in large measure a revolt from the formal and «dry» science-teaching, and its method is therefore essentially personal and informal. We are now in the experimental era. Perhaps no one yet knows how nature-study may best be handled in the schools. It is certain, however, that it should deal with actual things and phenomena. Its underlying method is observation,— the child actually to see the thing for himself, to know it intimately from first-hand contact. As a pedagogical method, the teaching of nature-study does not deal with abstractions, nor mere sentimentalism, nor primarily with poetry or

nature-study literature. It asks, What is the thing? What does it do, or how does it live, or why is it here? What relation does it bear to the conditions in which it is found?

The term nature-study is of common-school origin. It is very modern. It seems to have come into use in this country between 1884 and 1890. It grew out of "object teaching" and "elementary science" and "natural history." It is not equivalent to the teaching of zoology and botany, as classified sciences. It cares little for zoology and botany and geology, but everything for animals and plants and the out-of-doors. It is in large measure a return to the ideals of Rousseau, Froebel, Pestalozzi, and others, combined with a reaction from the unfree and over-nice laboratory methods into which we have fallen in the schools. Nature-study is an emancipation. Although nature-study is specially a common-school movement, its spirit is nevertheless of universal application, and, consciously or unconsciously, it is coming to dominate the point of view in all good nature-teaching anywhere,— in the actual study of the object in its natural setting.

The nature-study idea is one of the movements that are democratizing education. The Greek and mediæval ideals are adapted to the few and the special rather than to the many. We have believed that some few subjects alone are profitable as educational means; these subjects are the ones that are most capable of being put into books. But a subject that cannot be put in a book is nevertheless capable of being made the means of training a mind,— and among these subjects are those that make the most direct and personal appeal to children and youth. It is not to be supposed that the older subjects are to be banished from the schools, but only that new ones are to be added. We are just now perplexed as to how to handle the many subjects that are coming into the schools. The truth is, however, that all subjects with which men engage and in which they are interested are to be taught, both as a means of intensifying the hold on life and of enlarging the spiritual horizon. We have made the mistake of thinking that some subjects lead to "culture" and that others do not. All subjects should lead to that end. How to adapt and use all these many subjects in the schools is not the purpose of this article to inquire: this must be worked out with patience and forethought in the time that is just ahead of us.

We have reason to expect a gratifying secondary result of the nature-study idea in the movement that it must set up toward the country. There is still a strong tendency to remove to the city. The attraction to the city is both financial and social, chiefly financial. It is time that we set other ideals than money. The person that understands soils and plants and animals and fields should be able to develop the resources of the country and to make a comfortable living from the land; and the mind that is sympathetic with nature does not need to go to the city for entertainment. Our educational systems and points of view are chiefly such as help the city man rather than the country man.

While it is not the purpose to enter into a discussion of the methods of teaching nature-study, attention should be called to some of the most important dangers. (1) There is danger of giving relatively too much attention to mere subject-matter or fact. Nowhere should the acquiring of mere information be the end of an educational process, and least of all in nature-study, for the very essence of nature-study is spirit, sympathy, enthusiasm, attitude toward life. It is these results that the youth gets naturally when he associates in a perfectly free and natural way with objects in the wild. Science-teaching has often fallen short of its goal in the elementary schools — and even in the colleges and universities — by insisting so much on the subject-matter as to forget the pupil. In standing so rigidly for the letter, we have missed the spirit. (2) A second danger is making the instruction too long and too laborious. A child's mind cannot be held to a subject profitably for any great length of time. As soon as the child becomes weary of giving attention, the danger-point is reached; for thereafter there is loss in the spirit and enthusiasm, however much may be gained in dry subject-matter. Even in high schools and colleges we make mistakes in demanding too long-continued application to one subject. Short, sharp, enthusiastic exercises, with pith and point, of five to ten minutes' duration, are efficient and sufficient for most purposes, particularly with beginners. (3) A third danger is the practice of merely telling or explaining. Set the child to work, and let the work be within the child's own realm. Pollen, lichens, capsules, lymphatics, integuments — these are not within the child's range: they smack of the museum and the text-book. Yet it appears to be the commonest thing to put mere children at the subject of cross-fertilization: they should first be put, perhaps, at flowers and insects. In every schoolroom might be hung with profit the motto, "Teaching, not telling." (4) A fourth point is the danger of adhering too closely to the book habit We are gradually growing out of the book slavery even in arithmetic and grammar and history. This means a distinct rise in the abilities of the teacher. Of all subjects that should not be taught by the book, nature-study is chief. Its very essence is freedom from tradition and "method." Nature-study books are most useful as sources of fact and inspiration, but not as class texts. The good teacher of nature-study must greatly modify the old idea of "recitations." President Eliot writes: "Arithmetic is a very cheap subject to teach; so are spelling and the old-fashioned geography. As to teaching history in the old-fashioned way, anybody could do that who could hear a lesson recited. To teach nature-studies, geometry, literature, physiography, and the modern sort of history requires well-informed and skilful teachers, and these cost more than the lesson-hearers did." (5) Finally, we must come into contact with the actual things, not with museums and collections. Museums are little better than books unless they are made to be very secondary means. The museum has now become a laboratory. The living museum must come more and more into vogue — living birds, living plants, living insects. The ideal laboratory is the out-of-doors itself; but for practical school purposes this must be supplemented. The most workable living laboratory of any dimensions is the school-garden. The true school-garden is a laboratory plat; time is coming when such a laboratory will be as much a part of a good school equipment as

blackboards and charts and books now are. It will be like an additional room to the school building. Aside from the real school-garden, every school premises should be embellished and improved as a matter of neighborhood and civic pride; for one cannot expect the child to rise above the conditions in which it is placed. All these dangers cannot be overcome by any "system" or "method"; they must be solved one by one, place by place, each teacher for himself. Whenever nature-study comes to be rigidly graded and dressed and ordered, the breath of life will be crushed from it. It is significant that everywhere mere "method" is giving way to individualism.

In time, the methods of teaching nature-study will crystallize and consolidate about a few central points. The movement itself is well under way. It will persist because it is vital and fundamental. It will add new value and significance to all the accustomed work of the schools; for it is **not** revolutionary, but evolutionary. It stands for naturalness, resourcefulness, and quickened interest in the common and essential things of life. It is strange that such a movement is necessary. It would seem to be the natural, and almost the inevitable, thing that the education of the child should be such as to place it in intimate relation with the objects and events with which it lives. It is a fact, however, that our teaching has been largely exotic to the child; that it has begun by taking the child away from its natural environment; that it has concerned itself with the subject-matter rather than with the child.

The literature of nature-study is of three groups: that dealing with the underlying pedagogical conceptions, a group that is yet small and undeveloped; that setting forth courses and methods, a group that comprises a large number of books and leaflets; that of the "nature writers," appealing to the general public, and now very voluminous. Probably no recent development of literature is so marked as the writing about "nature"; and this tendency is a good criterion of the enlargement of our sympathies and of our growing interest in realities. All publishers of educational books issue nature-study guides and texts, and the number is rapidly increasing; it is therefore impossible to give a list here. Some of the American writers in the educational field, aside from specialists in the various departments, are W. S. Jackman, C. F. Hodge, Mrs. L. L. W. Wilson, F. O. Payne, O. P. Jenkins, V. L. Kellogg, D. Lange, C. B. Scott, C. A. McMurray, A. C. Boyden.

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Nature Worship, a religious belief in which the powers of nature are personified and worshipped. It found its highest and most beautiful expression in the mythology of ancient Greece. In the classification of religions with regard to the estimation in which the Deity is held, Lubbock makes nature worship the second stage, atheism (the absence of definite ideas on the subject) being the first. See MYTHOLOGY.

Naucratis, nâ'kră-tĭs, Egypt, an ancient Greek colony, the remains of which are near Nebireh, 50 miles by rail southeast of Alexandria. It existed as early as the beginning of the 7th century B.C., and was approached by a navigable canal in the western part of the Delta, near the Canopic branch of the Nile. Its chief period of splendor was during the reign of Amasis II., 570–520 B.C., under whom it was recognized as the official capital of the Greeks in Egypt. Its site was rediscovered in 1884 by Professor Flinders Petrie. Subsequent excavations have uncovered the remains of buildings described by Herodotus, the Hellenium, temples to Apollo, Aphrodite, the Dioscuri, etc., and there have been valuable finds of early Greek pottery and other archæological treasures. Consult Petrie, 'Naucratis' (1886).

Naucydes, nâ-sī'dēz, Greek sculptor. He flourished in the first quarter of the 4th century B.C. His birthplace was Argos and he was the pupil of the Elder Polycletus of the Peloponnesian school of sculpture. He carved a chryselephantine statue of Hebe for the temple of Hecate at Argos; a bronze statue of Hecate; a Hermes; several statues of Victory; a portrait of the poetess Erinna; 'Phryxus Sacrificing the Ram' (for the acropolis at Athens); and a Discobolus. The younger Polycletus was his pupil.

Naugatuck, Conn., town and borough in New Haven County; on the Naugatuck River, and on a division of the New York, N. H. & H. railroad; about 28 miles south by west of Hartford and 15 miles northwest of New Haven. In 1844 it was incorporated as a town, and as a borough in 1893. The chief manufactures are rubber goods, paper boxes, knit goods, machine-shop products, and cigars. It has considerable trade in farm products, especially tobacco. It is well supplied with schools; it has besides the public and parish elementary schools, the Whittemore High School, the Salem School, Sacred Heart Academy (R. C.), and the Whittemore Memorial Library. The government is vested in a board of warden and burgesses, who hold office one year, and who appoint all the administrative officials except the board of education, the members of which are chosen by popular vote. Pop. (1890) 6,218; (1900) 10,541.

Naugatuck, nâ'ga-tŭk, a river in Connecticut, has its rise in the northern part of Litchfield County, and flows south, about 60 miles, and enters Housatonic River at Derby. It flows through a mountainous part of the State, and supplies water power to many mills and factories. Waterbury (q.v.) is the chief city on its banks.

Naulette, nō-lĕt', a large cavern in Belgium, near Dinant. Here, in 1866, was found the lower jaw of a human, together with the bones of the elephant and rhinoceros. The human remains were assigned to the Monsterian epoch.

Nauma'chia, or **Naumachy** (from the Greek *naus,* a ship, and *machē,* a fight), among the Romans a public spectacle, representing a naval action. Cæsar was the first who exhibited a spectacle of this sort, which soon became the favorite amusement of the Roman people. Buildings were erected by the emperors, specially adapted for the purpose. They resembled the amphitheatres, and like them were at first built of wood. Domitian erected one of stone. A *naumachia,* built by Augustus, was 1,800 feet long and 200 wide, and was capable of contain-

ing 50 ships with three banks of oars, besides many small vessels. They were suddenly laid under water by means of subterranean canals, so that the ships were raised at once from the dry floor before the eyes of the spectators. These sea-fights were exhibited with the same splendor and reckless disregard of human life which characterized the gladiatorial combats. Titus exhibited a sea-fight in which 3,000 men were engaged, and ships almost equal in number to two real fleets were shown in combat by Domitian.

Naumann, Johann Friedrich, yō'hän frēd'rĭH now'män, German ornithologist: b. Ziebigk, Germany, 14 Feb. 1780; d. there 15 Aug. 1857. He studied with his father, who was an ornithologist, and became professor and inspector at the ornithological museum of the Duke of Anhalt-Köthen. His most valuable contribution to the science of ornithology is the 'Naturgeschichte der Vögel Deutschlands' ('Natural History of the Birds of Germany'), published in 1822–4; he prepared the illustrations for this work, making the plates for more than 500 copper engravings. He also wrote 'Taxidermie' (1815); 'Ueber den Haushalt der nördlichen Seevögel Europas' (1824); and, with Buhle, 'Die Eier der Vögel Deutschlands und der benachbarten Länder' (1819–28). A statue of him was erected at Köthen in 1880, and the German Ornithological Society named its official organ in his honor 'Naumannia.'

Naumann, Johann Gottlieb, yō'hän gŏt'lēb, German composer: b. Blasewitz, near Dresden, 17 April 1741; d. Dresden 23 Oct. 1801. Thanks to the interest of a rich Swedish amateur, Weeström, he was taken to Italy when 16, and there studied under Tartini. He became court composer at Dresden in 1765, and kapellmeister in 1774, a post to which he returned in 1786, after six years in Stockholm. His music, including operas, oratorios, and symphonies, was essentially Italian in style and is no longer popular. Consult the biography by Nestler (1901).

Naumann, Karl Friedrich, son of J. G. Naumann (q.v.), German mineralogist: b. Dresden 30 May 1797; d. there 26 Nov. 1873. He was educated at Freiburg, Jena and Leipsic, and in 1821 made a scientific tour in Norway. He was an instructor in the University of Jena in 1823, and professor at Leipsic in 1826. From 1826 to 1842 he was professor of crystallography at Freiburg, and from 1842 till shortly before his death held a professorship at Leipsic. Among his works are: 'Anfangsgründe der Krystallographie' (2d. ed. 1854); 'Elemente der Mineralogie' (12th ed. 1885).

Nau'mannite, in mineralogy, is the name given to a native selenide of silver and lead found in the Harz Mountains and so called from K. F. Naumann (q.v.). This mineral contains about 26 per cent of selenium, 65 per cent of silver, and 6 per cent of lead; in some samples a great part of the silver is replaced by lead. Specific gravity about 8.0. Color and streak iron-black.

Naumburg, nowm'boorg, or **Naumburg-on-the-Saale,** zä'lĕ, Germany, a town of the Prussian province of Saxony, on the Saale, near the junction of the Unstrut, 28 miles southwest of Halle. Its chief edifice is the restored cathedral, which has four lofty towers, one the gift of William II., erected in 1894. The town has some manufactures and a considerable wine trade. It became an episcopal see in 1029. In the 15th and 16th centuries, several treaties were concluded at Naumburg, and the town was of great strategical importance during the Thirty Years' war and the wars of 1806 and 1813. Pop. (1900) 23,817.

Naupactus, nâ-păk'tŭs. See LEPANTO.

Nauplia, nâ'plĭ-ą, Greece, a fortified seaport town, capital of a nomarchy, at the north extremity of the Gulf of Argos, 25 miles by rail south of Corinth. It was occupied by the Venetians in the 13th century and was taken by the Turks in 1540. From 1824 to 1835 it was the capital of Greece, but declined in importance after the removal of the court to Athens. Pop. (1889) 10,879.

Nauplius, nâ'plĭ-ŭs, in Greek mythology, the son of Neptune and father of Palamedes. He is said to have revenged the death of his son by deceiving the Greeks by false beacons, as they returned from Troy, and causing their vessels to be wrecked. See MYTHOLOGY.

Nauplius. See LARVA.

Nausea (Latin, from Greek *ναυσία*, seasickness), a sensation of sickness and distress, of which the leading characteristic is squeamishness of the stomach. The disturbance, however, extends to the entire system. In severe cases languor affects every part; the pulse is small; the skin moist and pale; the flow of saliva increases; and if vomiting does not immediately accompany the sensation, the apprehension of it is painfully present. The causes of nausea are many: blows upon sensitive parts, mental shocks, hysteria, pregnancy, irritation or tumors of the abdominal or the pelvic viscera may produce it, as may also the early stage of zymotic disease, or epilepsy, diseases of the brain, etc. See VOMITING.

Naushon, nâ-shŏn', the largest of the Elizabeth Islands (q.v.), off the southeast coast of Massachusetts.

Nautch, nâch, in India, a dance performed by the dancing girls attached to the temples, called Nautch girls or Nautchee, who are brought up and trained to all the arts and allurements of their profession. It is probably a survival of the ancient custom of sacred prostitution. They move with slow, undulatory movements of the body, while the feet are but little used.

Nautical Almanac. See ALMANAC; NAVIGATION, THE SCIENCE OF MODERN.

Nautical Schools. See NAVAL SCHOOLS; NAVAL SERVICE.

Nautical Surveying. See HYDROGRAPHY; SURVEYING.

Nau'tilus, a marine cuttlefish of the genus *Nautilus* and family *Nautilidæ*, a few living species of which are the only survivors of the order or superorder *Tetra branchiata*, which, including both the nautiloid forms and the ammonites (q.v.) is divided into no less than 22 extinct families, so abundant were they in past ages. The nautiloids began in the Cambrian, became greatly differentiated and abundant in the Silurian and Carboniferous, and by the close of the Palæozoic Age had become almost

entirely extinct. The more complex ammonites, on the other hand, reached their full development only during the Mesozoic Age. The shell of the pearly or chamboid nautilus, described below, is typical of the armature of the group. It is at first simple, but as the animal grows becomes coiled in a flat spiral and divided by internal transverse septa into a succession of chambers, the last one of which is occupied by the animal. This process is continued until about 36 chambers have been formed, all but the last filled with gas which gives a certain buoyancy, but does not enable the animal to come to the surface. Externally the shell is porcellaneous; internally is a layer of mother-of-pearl. The septa are perforated by an opening, through which a fleshy cord or siphuncle passes from the posterior end of the animal to the apical or first chamber of the spire. Among other anatomical peculiarities the animal has four gills and four kidneys, calcareous instead of horny beaks, a funnel composed of two lobes instead of one tube, small stalked eyes, and no ink bag. Quite unique are the tentacles, which number about 90. On each side of the head are a hood tentacle, two ocular tentacles, and 17 brachial tentacles, and around the mouth four groups of 12 or 13 labial tentacles.

The best-known species is *Nautilus pompilius* which, with two others, inhabits the Indian Ocean and tropical parts of the South Pacific. They live exclusively on or near the bottom in relatively deep waters, are gregarious, more or less migratory, and nocturnal. Although fond of any animal matter, they feed chiefly on prawns. In swimming they dart quickly backward for short distances, with the tentacles either radiating or held together and stiffly projecting from the mouth of the shell; but they are inactive and rest most of the time on the bottom. Little is known of their breeding, which is supposed to take place in deep holes. The eggs are very large; including the capsule they measure nearly 1½ by ¾ inches. They are attached singly by the base, and the capsule is irregularly folded and fenestrated longitudinally in a most peculiar manner. This species is very abundant in about 60 fathoms of water in the Philippines, and large numbers are captured by the fishermen in bamboo fish traps or baskets constructed on the principle of the lobster pots in use on the New England coast and baited with any kind of animal offal. The shells are somewhat used in the arts, but the flesh is little esteemed for food, as is that of the native species by the Fiji Islanders. Consult: Willey, 'Zoological Results,' Part VI. (Cambridge, 1902), and Lacaze-Duthier, 'Arch. Zoologie Experimentale' (1892).

The "paper nautilus" is a very different animal, for which see ARGONAUT.

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Nautilus, in hydraulic engineering, a diving-bell requiring no suspension. Water admitted through the cock into pipes flows into the exterior chambers, causing the apparatus to sink. The workmen enter through an aperture at the top, closed by an air-tight cover, and can in still water move the machine in any required direction by stepping on the ground and pushing. Air is condensed in a reservoir at the surface to a degree somewhat greater than the condensation due to the depth, and passes through a pipe into the chambers rendering the machine specifically lighter than water, and enabling it to lift stones or other objects below. A gauge indicates the amount of lifting power attained as the air is admitted.

Nautilus Propeller, in marine engineering, a water-jet propeller on the reaction principle. Water is forced by a turbine driven from the engine, through two nozzles, one on each side of the vessel, and directed fore or aft. See NAVAL ARCHITECTURE.

Nauvoo, nâ-voo', Ill., city in Hancock County; on the Mississippi River; about 30 miles below Burlington, Ia. It is situated in an agricultural and fruit growing region in which grapes and berries are the chief products. The principal industries are connected with the manufacturing of wine and the shipping of wine and fruits. It is the seat of Saint Mary's Academy (R. C.).

Nauvoo was founded by the Mormons (q.v.) in 1840, and in 1846 it had a population of 15,000. It had mills, factories, stores, schools, etc. Its most conspicuous building was a temple built of white limestone, 130 feet long and 90 feet wide. The temple was not completed when the Mormons were expelled in 1846; in 1848 it was partially destroyed by fire, and in 1850 it was further ruined by a tornado. A company of French Socialists, called Icarians, took possession of Nauvoo in 1850 and remained until 1857. The "Nauvoo Legion," a Mormon military organization, which embraced all the boys and men between the ages of 16 and 50, was founded here in 1840, and in 1857 was reorganized in Utah. At the last muster, in 1870, it had a membership of 13,000. Pop. (1890) 1,208; (1900) 1,321.

Nava, nä'vä, a seaport of Japan. See NAFA.

Navajo Indians. The meaning of the word Navajo is indefinite; said by Benavides (1630) to signify "great planted fields"; it is probably not from the Spanish *navája,* "knife," as has been supposed. An important tribe of the Athapascan or Tinne stock of Indians, now on a reservation of about 9,442,240 acres in northeastern Arizona, northwestern New Mexico, and southeastern Utah. Population estimated at 16,000. There is no evidence that the Navajos were seen by the Spanish explorers of the Southwest in the 16th century, although the latter passed through their present territory in 1540, 1583, and 1598; it is therefore believed that at this early period they were an insignificant agricultural tribe, but gradually increased in population largely through the adoption of natives of both allied and other stocks during succeeding years. Their territory is entirely within the arid region and their lands are chiefly desert; but in the cañons and about the bases of the mesas that abound in their territory, horticulture is practised through deep planting in the sandy soil, while in the valley of the Rio San Juan, which is the largest stream in their country, farming is carried on to a greater extent. Agriculture, however, forms but a meager part of the Navajo's subsistence, his livelihood being gained principally from the flocks and herds, of which, in 1902, there were 380,000 sheep and 67,000 goats, the former of which, besides fur-

nishing the chief food supply, netted $150,000 in wool and blankets. These blankets, which have become celebrated, are woven by the women on simple looms and in pleasing and sometimes intricate designs of various colors. Formerly native dyes of rare delicacy of tone were employed, but in recent years these have given way to glaring aniline colors, and the decorative patterns have also been largely modified to meet the demands of the white man, so that as specimens of aboriginal handiwork very few of the Navajo blankets now woven are comparable with those formerly made. The Navajos also weave belts, garters, and saddle-girths, and make a few excellent baskets, mostly for ceremonial use. Some of the men are expert silversmiths.

Although more closely related in language to the Apaches than to any other tribe, the Navajos are greatly mixed, embodying elements of Pueblo, Shoshonean, Yuman, and even of Spanish blood; hence there is perhaps a greater variety in their physical features than among most Indian tribes.

The typical Navajo dwelling is a conical framework of logs or sticks covered with brush, bark, or grass, and earth, with a smoke-hole at the apex and a doorway in one side. Rude shelters with open fronts are erected for use in summer. If a person dies in a house the latter is believed to become haunted and is henceforth tabooed.

Dr. Washington Matthews, U. S. A., who has studied the inner life of the tribe, discovered the existence of 51 clans, grouped into about a dozen phratries, which latter, however, are probably not homogeneous organizations as among some Indians. A Navajo belongs to the clan of his mother, and a man may not marry a woman belonging to his own clan; or, as a rule, one of his own phratry. Their religion is elaborate and complicated. They have a great many ceremonies, most of which are performed for healing the sick, but others are conducted to insure success in planting, harvesting, building, war, nubility, marriage, travel, etc., and for bringing rain. Sacrifice, elaborate dry paintings with sand and pigments, masquerade, dancing, prayer, and song are the elements of the ceremonies, the gods being personated by the masked performers. No supreme god is recognized; there was no great creator of the world, the latter have existed, in the Navajo belief, at the time of their origin as a people. There are many beneficent gods as well as malevolent gods or genii, and devils.

Almost from the beginning of the 17th century the Navajos were enemies of the sedentary tribes and of the Spanish colonists, and although they were never so predatory and warlike as their Apache cousins, the Spanish villages and Pueblo settlements suffered almost continuously from their raids up to the time of the conquest of New Mexico by American forces in 1846, followed by the establishment of military posts throughout the Southwest. Treaties were made with the tribe in 1846, 1848, and 1849, but they were of no avail in keeping in check their depredations, which continued at intervals until 1858, expeditions meanwhile being led against them. In the year last named the Navajos killed a negro servant at Fort Defiance, as a direct result of which it became necessary to wage warfare against the Indians from August until December, during which 50 Navajos were killed and a large number of sheep and other stock lost. Another treaty was signed, but during 1860 the depredations continued, and another expedition was led against them, but without success. In April the natives boldy attacked Fort Defiance, but were repulsed. In the winter of 1860–1 an active campaign was made against them, and although practically their only loss was in sheep, they were compelled to sue for peace in February 1861, when an armistice of a year was agreed to, during which the troops were withdrawn. In a dispute over a horserace at Fort Fauntleroy (near the present Fort Wingate), New Mexico, a dozen Navajos were brutally killed. Emboldened by the withdrawal of the troops on account of the Civil War, the Indians resumed their raids, which they continued almost uninterruptedly until 1863, when Col. Christopher ("Kit") Carson began operations against them and a plan was formulated to transfer the Navajos from their old haunts to Fort Sumner, at the Bosque Redondo, on the Pecos River, in eastern New Mexico. It was determined that all who refused to go after 20 July would be regarded as hostile and be treated accordingly, yet by the close of the year only 200 prisoners were at Fort Sumner or on the way thither. Early in 1864 Carson made a campaign to the Cañon de Chelly, in the heart of the Navajo country in northeastern Arizona, where he killed 23 and captured over 200 of the Indians. This taught the latter a lesson, so that by the close of 1864 more than 7,000 of the tribe were held as prisoners at the Bosque Redondo; these were increased to 8,491 in 1865, but it was supposed that this number did not represent more than half of the tribe. The experiment, however, proved a failure, so that after the death of about a thousand of the Indians, the escape of others, and an expenditure of about a million dollars in their support in a region ill-adapted to their progress, the remainder, numbering 7,304, were removed to their old country in July 1868, an appropriation of $422,000 having been made in that year to give them a new start. Since that time the Navajos have been peaceable and industrious. They make good laborers and are slowly developing agricultural pursuits. In 1902 they had 8,000 acres under cultivation, which yielded 1,200 bushels of wheat, 700 bushels of oats, etc., and 3,000 bushels of corn. They earned in addition a quarter of a million dollars by the product of their labor, and besides the sheep and goats above mentioned owned 47,260 horses, mules, and burros, and 8,000 cattle. There are 189 Navajo children in two government reservation schools, the support of which cost about $28,000 in 1902. There are also 4 sectarian missions and 2 mission schools on or near the reservation. Consult: Matthews, 'Navajo Legends' (1897), and the bibliography therein; Matthews, 'The Night Chant, a Navajo Ceremony' (1902); Mindeleff, 'Navajo Houses' (17th Rep. Bur. Am. Ethnology, 1901); Matthews, 'A Two-faced Navajo Blanket' ('American Anthropologist,' Vol. II., pp. 638–42, 1900); Hrdlicka, 'Observations on the Navajo' ('American Anthropologist,' Vol. II., pp. 339–45, 1900); Hollister, 'The Navajo and his Blanket' (1903).

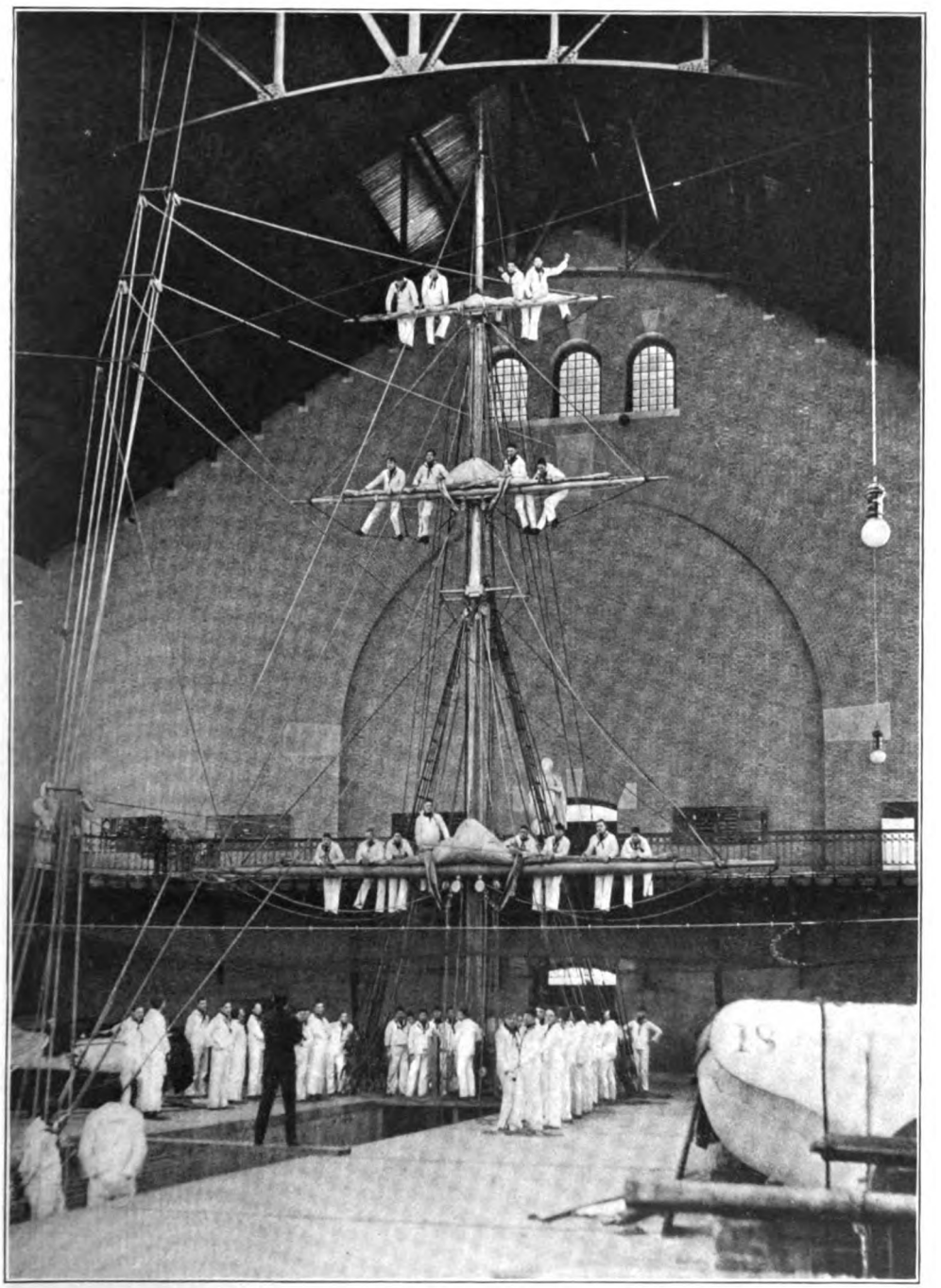
F. W. Hodge,
Smithsonian Institution, Washington, D. C.

Naval Academy, United States, the most important naval school in America, established at Annapolis, Md., in 1845, by a special act of the Congress. The origin of this technical educational institution was due primarily to the efforts of George Bancroft, secretary of the navy. The Academy was opened 10 Oct. 1845, with Commander Franklin Buchanan as superintendent. For a time during the Civil War the school was removed from Annapolis to Newport, R. I. The Bureau of Navigation of the Navy Department has direct supervision of the Academy.

Admission of Students.—There are received at the Academy, one naval cadet for each member or delegate of the United States House of Representatives, one for the District of Columbia, and 10 at large. The appointment of cadets at large and for the District of Columbia is made by the President. The Secretary of the Navy, as soon after 5 March in each year as possible, must notify in writing each member and delegate of the House of Representatives of any vacancy that may exist in his district. The nomination of a candidate to fill the vacancy is made, on the recommendation of the member or delegate, by the secretary. Candidates must be actual residents of the districts from which they are nominated. The course of naval cadets is six years, the last two of which are spent at sea. Candidates at the time of their examination for admission must be not under 15 nor over 20 years of age and physically sound, well formed, and of robust constitution. They enter the Academy immediately after passing the prescribed examinations, and are required to sign articles binding themselves to serve in the United States navy eight years (including the time of probation at the Naval Academy), unless sooner discharged. The pay of a naval cadet is $500 a year, beginning at the date of admission. At the end of the third year the new first class is separated into two divisions, namely, the Line Division and the Engineer Division, the numbers of these divisions being proportioned to the vacancies that have occurred in the several corps during the preceding year. At the end of the six years' course appointments to fill vacancies in the line and in the Marine Corps are made from the Line Division, and to fill vacancies in the Engineer Corps from the Engineer Division. If, after making assignments as above, there should still be vacancies in one branch and surplus graduates in the other, the vacancies in the former may be filled by assignment to it of surplus graduates from the latter. At least 15 appointments from such graduates are made each year. Surplus graduates who do not receive appointments are given a certificate of graduation, an honorable discharge, and one year's sea pay.

The Course of Study.—When a cadet graduates he must be a seaman, an engineer, a true marine engineer, well acquainted with steam, electricity and ordnance, and a navigator and surveyor, and he must have a fair knowledge of his own language with some acquaintance with French and Spanish. To achieve this in four years he must be well grounded in the rudiments; he must have good health, and he must work hard. The course must be progressive and the instructors competent and in sufficient numbers to be able to instruct — not merely to examine and hear lessons. Even then the work of studying would be too hard for the average youth were it not for the fact that much of the practical work is good out-of-door exercise and the hard brain work is well balanced with plenty of physical exercise and healthy amusement. The instruction for the fourth class, that is for the first year, completes the study of algebra and geometry and includes trigonometry and descriptive geometry. In English it includes rhetoric and something of the art of writing English and Andrews' 'Manual of the Constitution.' French and Spanish and mechanical drawing are begun. It is a necessity for a naval officer to be able to read a drawing and to make a good working sketch. The naval architect, the marine engineer, and the ordnance engineer has each his special methods in drawing, with which the cadet must become familiar. Accordingly he starts drawing with the beginning of his course. All his professional work during this year is practical and is given him during the drill period. The academic year opens on 1 October and closes about 1 June; then comes the practice cruise, which is devoted almost entirely to practice professional work with some little study of the theory of professional subjects. The cruise ends about 1 September when the cadets have a month's leave to visit their homes. Academic life begins again on 1 October. During the third-class year the cadets complete their studies in the mathematical department. They have trigonometry, descriptive geometry, conic sections, differential and integral calculus. In English they study naval history. They continue the study of French and Spanish, and mechanical drawing, and take up the study of elementary physics and chemistry. Their practical work is continued during the drill period and on the practice cruise at the end of the academic year.

Second Class Men.—After the month's leave they take up their life at the Academy as second-class men, and now begin to take up the study of professional subjects. In the department of mechanics they study integral calculus, mechanics and hydro-mechanics. They continue the study of physics and chemistry and begin the study of electricity and magnetism. They continue mechanical drawing and lay the foundation for engineering in studying the principles of mechanism and mechanical processes, with marine engines and boilers. They study theoretical seamanship and the drill regulations for infantry and artillery. The practical work continues during the drill period and has advanced progressively so that the cadets are well prepared for the professional subjects of this and the following year. This is their last practice cruise, and by far the most important one, as they are now carefully instructed in their duties as officers. They are required to perform the work of officers at sea in handling the ship and managing the motive power, both steam and sail. They must work hard at practical navigation with instruments and charts. They visit the great shipyards of the country, listen to lectures and take notes, with the ships and engines under construction as object lessons. In their last year as first-class men all their studies are professional. They have seamanship and naval tactics, ordnance and gunnery, navigation, compass deviations and surveying, boilers, engineering materials, designing and naval construction, and elec-



APPARATUS FOR INDOOR TRAINING IN HANDLING A FULL-RIGGED SHIP. I.

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trical engineering. The practical work goes hand in hand with the theoretical during the drill period. The first class are the officers of the cadet battalion and under supervision perform much of the work of officers.

Sea Service.—At the end of their first-class year the cadets are graduated and are ordered to sea. Here they nominally continue their course for two years, being examined at the completion of that time and commissioned as ensigns. Actually their work as officers begins after leaving the Academy, and under the present necessity for more officers they perform the duties of even higher grades than that of ensign. In fact they perform the duties of commissioned officers without the rank or pay or right to pension or retirement in case of injury or illness in line of duty.

Athletics.— To discuss the training of cadets at the Naval Academy without mentioning athletics would be to leave out a most important factor in their character training. Boating, football, baseball, fencing, track athletics, and gymnasium work are all encouraged. The various competitive games are a source of amusement to all and of healthy exercise to many. Courage and skill are gained and self-denial must be practised by those who train for the various sports, and athletics furnishes one of the most important aids in training a youth to become an officer.

Academy Buildings.— In 1895 was commenced a new and improved plan of construction and reorganization of the school buildings at Annapolis. The new buildings are largely due to the efforts of two men — the superintendent at that time, Capt. Philip H. Cooper, now rear-admiral, and Col. R. M. Thompson, who graduated in 1868 and was in 1895 a member of the Board of Visitors. The board recommended the rebuilding of the Naval Academy and the energy of these two men pressed the scheme upon the government. The department was induced to order a board to consider and recommend a comprehensive plan for all the necessary buildings, and Colonel Thompson persuaded the New York architect, Ernest Flagg, to consult with the board and with Captain Cooper. A beautiful set of plans resulted, recommended by the board and approved by the department. But the Spanish War interfered and it was not till 1898 that an appropriation became available and the cornerstone of the new armory was laid by Rear-Admiral F. V. McNair, who had succeeded Captain Cooper as superintendent. The plan as viewed from the sea front shows the cadet quarters extending 729 feet, flanked on one side by the armory and on the other by the boat house. These buildings are at right angles to the direction of the cadet quarters, are 428 feet long and similar in appearance. They are connected by colonnades with the quarters. This gives from the sea a harmonious group of buildings extending in a northeast and southwest direction for 1,278 feet with the high roof of the main building of the cadet quarters as a centre. Thirteen hundred feet in a northwest direction, with the main line of buildings parallel to and facing the first group is the academic building with the chemistry and marine engineering buildings on either flank and with the high roof of the academic building in the centre and balancing the group to the southeast. Between these two groups, facing the Severn River and forming the west side of the rectangle, is the auditorium and chapel, with the superintendent's house and the administration building on either side. The fourth side of the rectangle is formed by the basin. From the steps of this basin and facing the auditorium is the best view. On either hand is a handsome group of buildings with the dome of the auditorium as the centre. The new buildings involved an outlay of over $8,000,000.

Naval Apprentice. See NAVAL SERVICE.

Naval Architects and Marine Engineers, The Society of, an American society with over 500 members incorporated in New York State, and with headquarters in New York city. The society holds annual meetings and seeks to advance the art of shipbuilding.

Naval Architecture. The existence of naval architecture as an art is probably contemporaneous with the existence of man, but its development into a science is confined almost wholly to the 19th century and accompanied the advance in all mechanical sciences during that period. During the 18th century, and even earlier, some Continental mathematicians had devoted attention to the subject and developed various theorems concerning floating bodies which were likewise applicable to ships. Throughout this period the French were the acknowledged leaders in the development of knowledge relating to such matters. So much was this the case that it seems to have been not unusual for other countries to reproduce the models of French men-of-war, thereby admitting the excellence of the French type and paying deserved tribute to the labors of the naval architects of that country.

Perhaps the most notable attempt, however, to place naval architecture upon a logical and scientific basis, prior to 1800, was that of the famous Swedish naval architect, Chapman (1721–1808), who, during his long career, achieved special eminence in his profession and wrote a number of treatises relating to various features of naval architecture. One hundred years ago each nation, and, indeed, each master builder, carefully guarded as valuable secrets the methods and theories pertaining to the science of naval architecture, which had been deduced from experience or which had been handed down by those who had conducted previous investigations. This state of affairs, indeed, extended well into the 19th century, but with the rapid development of iron shipbuilding, which started about the middle of that century, came a rapid advance in naval architecture and dissemination of knowledge upon the subject, until, to-day, in the leading shipbuilding countries of the world will be found schools devoted to this subject; and the products of the naval architect's skill differ only in comparatively minor respects, whether turned out from British, European, American, or Japanese shipyards.

The primary object of the vast majority of all ships is to-day, as throughout the past, *transportation,* and the problem is only affected in its details in order to conform to the requirements of the articles carried, be they men, merchandise, or, in the case of men-of-war, armor, armament and other appliances for rendering

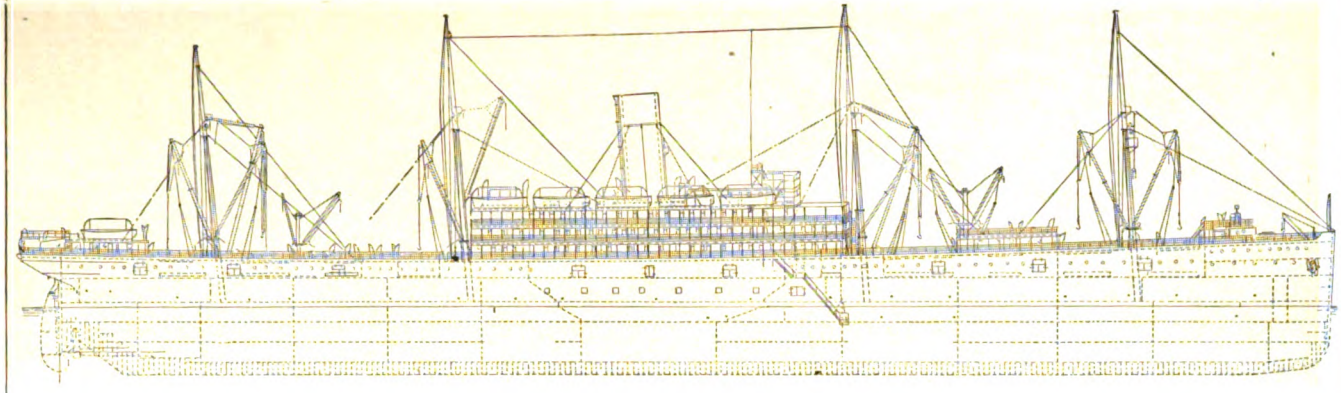
the vessel efficient as a fighting machine. The foregoing statement is quite as true of the humble 10-knot collier, which will carry in coal twice the weight of her hull, machinery, and outfit, as of the trans-oceanic passenger liner which carries a comparatively small amount of cargo but a large quantity of bunker coal to enable it to make a high speed, and provides luxurious accommodations for numerous passengers. It is true also of the man-of-war, which carries a proportionately large crew and a fair amount of cargo in the shape of consumable stores, coal and ammunition, besides a heavy weight of armor, armament and ammunition, and the necessary military adjuncts required by the special service upon which employed. Considering, then, all ships as bearers of burdens, there are two essential characteristics which they must show: They must be able to go from point to point at an appropriate speed and with all reasonable safety for ship, cargo and crew. Ability to keep the sea under all the usual conditions of its intended service is indispensable for every ship, and we will now consider briefly the detailed factors entering into the problem.

Buoyancy.—When a ship is entirely waterborne, the weight of water which it displaces is exactly equal to the weight of the ship itself and everything contained in it. To float at all, the volume of the enveloping surface of the ship must be greater than the volume of water which equals in weight the displacement of the ship. Clearly, for safety, there must be a margin, or reserve of buoyancy, in the ship over and above the buoyancy equal to its weight. The percentage of reserve buoyancy varies widely according to the type of vessel, passing from approximately zero in the case of diving, or submarine, boats (when in condition to dive), to as much as 100 per cent or more in the case of passenger vessels with large deck areas and high sides. In certain types of men-of-war, notably the large cruiser class, the percentage of reserve buoyancy is also very high. In the case of men-of-war, the reserve buoyancy is practically fixed by the design; but, in the case of merchant vessels, and particularly cargo carriers, which are subject to overloading, the reserve buoyancy is now practically determined by the marine insurance companies. The business of insuring ships and their cargoes is a large and important one, but is carried on by a comparatively small number of very powerful companies or associations, and these companies, for their own protection, have a well-equipped, scientific and technical staff and have prescribed conditions affecting the safety, or seaworthiness, of ships, which must be complied with in order to obtain insurance at a reasonable rate. In England, the Board of Trade, which is the department of the government charged with authority over matters relating to shipping, has acted in conjunction with the large insurance companies in laying down requirements for reserve buoyancy, these authorities being still further assisted by representatives of the national associations of naval architects. The actual amount of reserve buoyancy required varies somewhat with the size and type of vessel, and likewise with the character of the service, the maximum amount being required for vessels engaged in winter service in the North Atlantic Ocean. Speaking broadly, the objects aimed at in the load-line requirements are to obtain the greatest possible carrying capacity, compatible with safety of the vessel under all conditions of weather, after making provision for minor casualties which might still further reduce the reserve of buoyancy.

Structural Strength.—Buoyancy, however, is not the only requirement for seaworthiness of a ship. It is essential that the ship should be strong enough to withstand the stresses due to the action of the waves. In this direction, also, the insurance companies have taken a prominent position, and laid down minimum requirements acceptable for merchant vessels. Strength is obtained not only by the use of the best materials but by the disposition of the material used in such manner as to best accomplish the desired results. The methods used in determining the strength of ships are very similar to those used in determining the strength of other structures, such as bridges, but there is an essential difference due to the fact that it is practically impossible to determine the maximum load to which a ship may be subjected. It is comparatively easy to calculate the strength of the hull structure, knowing the disposition of the weights and buoyancy of the vessel. The stresses upon each part of the vessel's structure, when floating in still water, may be determined with accuracy; but the maximum stress will occur, not in still water, but among waves, and while we know that, whatever the motion of the sea, the buoyancy of the submerged portions of a ship must equal the total weight of the vessel and its contents (subject to minor corrections, due to the dynamic effect of the motions of the ship itself), it is obviously impossible to foresee the possible combinations and contours of waves to whose action the ship may be subjected and the consequent distribution of buoyant forces and structural stresses. Hence, the naval architect, in determining the structural requirements of a ship so far as they affect its strength, must be guided largely by experience. If he provides strength equal or superior to that of ships of the same type and not very dissimilar in size, which have shown no weakness in service, he has reasonable assurance that he is safe. But, when dealing with vessels of a novel type or size beyond precedent, the skill and judgment of the designer are taxed to the utmost to accurately estimate in advance and provide against the maximum stresses that may occur in service. In this respect, also, the accumulated experience of the marine insurance societies has been of great value in determining adequate strength associated with weight of structure which is not excessive, and which will permit a maximum development of carrying and other desirable qualities. The natural tendency of such societies, however, is to make sure of adequate strength, necessarily giving to weight and cost merely secondary consideration; so that whenever a novel type of ship is put forward, there is apt to be a period of discussion and unsettlement. The builders and owners naturally desire to provide only the minimum strength necessary, in their judgment, for complete seaworthiness, while, from the point of view of the insurer, if any error is made it should be positively on the side of excessive strength. As the results of experience accumulate, these questions adjust them-

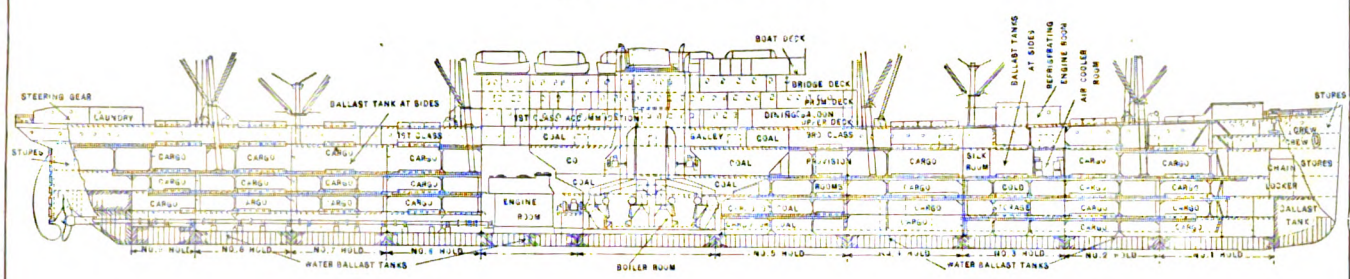
OUTBOARD PROFILE

STEAMSHIPS MINNESOTA AND DAKOTA



INBOARD PROFILE

STEAMSHIPS MINNESOTA AND DAKOTA



Length over all, about 630 ft. Beam, extreme, 73 ft 6 in. Depth, bottom of keel to upper deck at center, 56 ft. 1 in. Upper deck to promenade deck, 8 ft. 6 in. Promenade deck to bridge deck, 8 ft. Bridge deck to boat deck, 8 ft. Boat deck to captain's bridge, 7 ft. 8 in. Bottom of keel to upper navigating bridge, 88 ft. 3¼ in. Total water ballast, 5,072 tons.

Total coal capacity with reserve bunker, 6,195 tons. Total cargo capacity, excluding reserve bunker, about 30,000 tons. Total stores, 250 tons. First-class passengers, 253. Intermediate class passengers, 68. Steerage passengers, 1,300 to 2,400. Crew, 250.

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selves, but with the rapid development in the size of ships, and the variations in types which have been witnessed during the last quarter of the 19th century, shipbuilders and the insurance societies have not been entirely in accord on such questions.

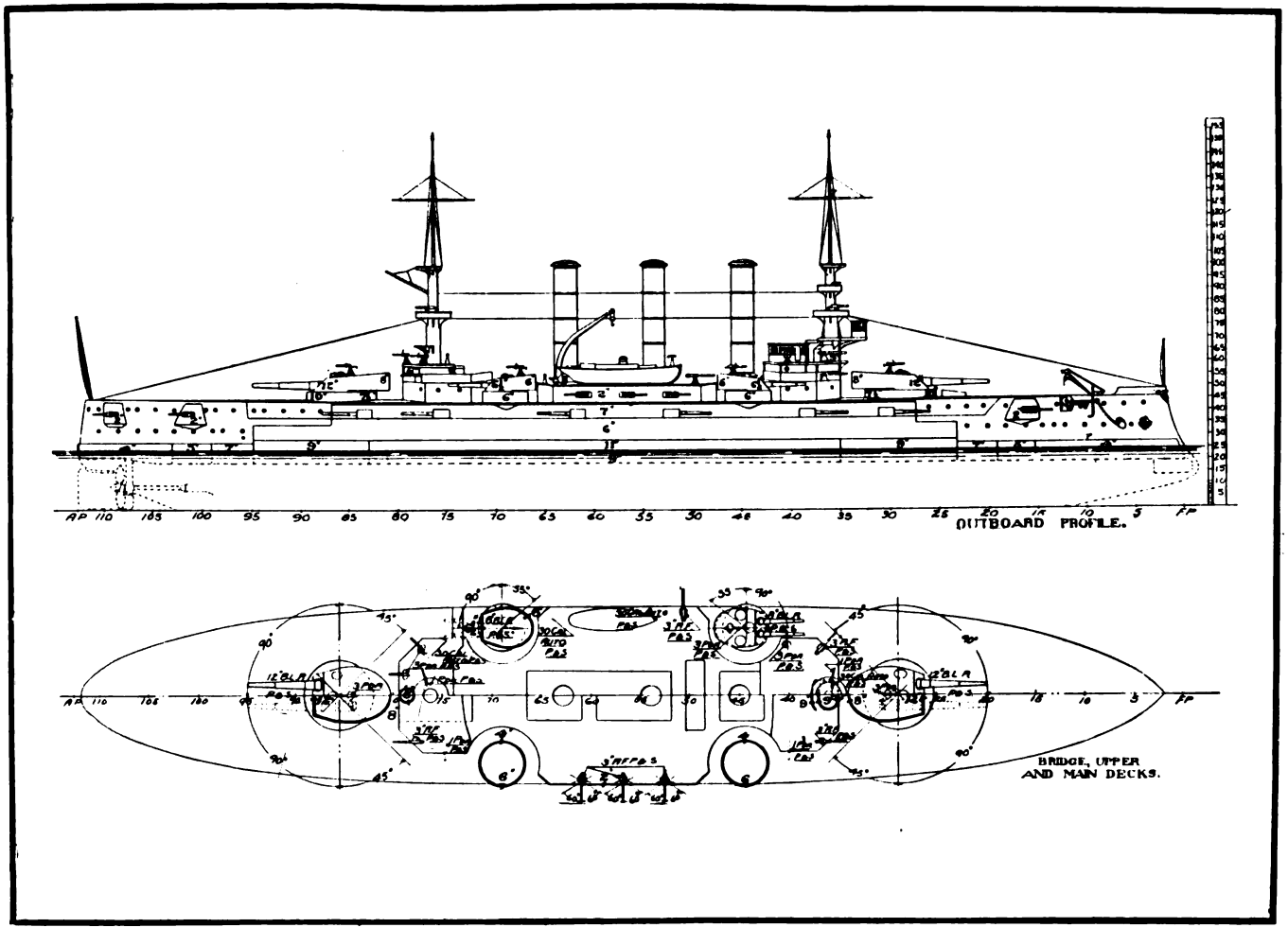
Stability.—In addition to the elements of adequate buoyancy and strength, there must be considered an equally important factor in the seaworthiness of the vessel,—namely, *stability.* This quality is all-important in rendering the vessel safe and enabling it to resist the capsizing effect of wind and waves. The stability problems which must be solved by the naval architect are practically peculiar to his profession. Sailing vessels, to avoid capsizing, must be handled with skill, and sail must be reduced in ample time to avoid the disastrous consequences of undue wind pressure. Steamers of the present day carry practically no sail, and are liable to be capsized by the sea only. But with them, too, there is room for skill in handling with reference to the direction of the waves, etc. It is the duty of the naval architect to provide a vessel, in either case, which, when handled with ordinary skill, will be stable under all probable conditions of wind and weather. The general features of the problem of stability are comparatively simple, and may be readily understood by considering a ship floating in still water. Under these conditions, the whole weight of the ship may be regarded as concentrated and acting downward through its centre of gravity. The upward forces of buoyancy may also be regarded as concentrated into a single upward pull through an imaginary point called the metacentre. With the ship at rest, the downward pull through the centre of gravity must be exactly equal to the upward pull through the metacentre. Evidently, if the metacentre is directly below the centre of gravity, there will be unstable equilibrium, since any slight accidental deflection of the centre of gravity would result in further deflection, the forces of buoyancy and gravity acting as an upsetting couple; if, however, the centre of gravity is below the metacentre, the resultant of the downward pull through the centre of gravity and the upward pull through the metacentre produces a righting moment tending to return the ship to the upright position. The name "metacentre" is supposed to have originated from the Greek word "meta," meaning "limit" or "goal" beyond which the centre of gravity cannot pass. Possibly it would have been more logical if the metacentre had been called the centre of buoyancy, thereby causing the nomenclature of the centre of buoyant forces to correspond more exactly to that of the centre of gravity. But in naval architecture, the centre of buoyancy is the name given to the centre of gravity of the volume of water displaced by the immersed portion of the ship. The line of action of the resultant upward forces of buoyancy must obviously pass through the centre of buoyancy, and it therefore follows that the centre of buoyancy and the metacentre are always found in one vertical line. The metacentre is not a fixed point but rises and falls as the ship inclines, owing to the varying shape and proportions of the immersed portion of the hull, and in every ship there is finally found an angle of inclination at which the metacentre is found directly below the centre of gravity. For inclinations greater than this, there is a tendency for the ship to capsize instead of right itself. The inclination at which this occurs is called the capsizing angle, and the angular range through which the vessel can be inclined without capsizing is called the "range of stability." Generally speaking, the less the freeboard (or height of side above water), the smaller the range of stability. In practice, the range of stability necessary for safety is affected somewhat by the initial metacentric height, or the distance between the centre of gravity and the metacentre when the ship is upright. The greater this distance, the greater the effort required to heel the ship, and hence the range of stability may be made less with safety. In practice, with any type of ship the range of stability can seldom be safely made less than 50°, and, in the majority of cases, should be much more. It is frequently over 100° for vessels of high freeboard. For safety alone, it is not always necessary that, initially, when in the upright position, the metacentre should be above the centre of gravity. If the metacentre is slightly below the centre of gravity, the vessel will heel over a few degrees to one side or the other until it reaches an inclination at which the metacentre rises above the centre of gravity and the vessel becomes stable again; if the freeboard of the vessel is high and the range of stability is great, such a vessel may be perfectly safe. Several of the large trans-Atlantic liners are purposely designed with comparatively small initial metacentric height, as such a condition permits the vessel to respond less quickly to wave action, and causes easy and slow rolling.

Rolling.—Closely associated with the question of stability is the question of rolling in a seaway. When a vessel is floating in disturbed water the effect is to change the relative location of the centre of buoyancy so that the metacentre shifts to one side or the other of a vertical line through the centre of gravity, causing a tendency to heel or roll the vessel until the metacentre again becomes immediately above the centre of gravity. Moreover, by this time the vessel has acquired certain angular velocity so that it swings beyond the position of equilibrium. An analysis of the theory of the rolling of ships at sea would be too complicated to be instructive in an article of this character, but, as in the case of stability, there are certain broad, underlying principles. These would be comparatively simple if in a floating body of ship-shape form the metacentre were fixed. In the case of a floating circular cylinder, such a condition does exist, the metacentre being fixed and remaining always at the centre of the cylinder. In such a case, the motion of a ship rolling is very closely analogous to what it would be if the vessel were suspended on pivots at the height of the metacentre. In such an imaginary case, in conformity with the well-known principles covering the motion of compound pendulums, the closer the metacentre is to the centre of gravity, the longer the period of oscillation, and the further the metacentre from the centre of gravity, the shorter the period of oscillation. In actual ships floating in water, however, the question is complicated by the varying position of the metacentre and the resistance of the water, which, in the absence of new disturbing causes, rapidly brings rolling ships to

rest. But the fact remains that vessels of large metacentric height are inclined to roll very quickly, while those of small metacentric height are sluggish in their rolling motion. When floating among waves which are large as compared with the vessel, the vessel of great metacentric height tends to float like a board, keeping its deck fairly parallel to the surface of the water; while the vessel of small metacentric height will at times be found rolling toward the wave crest instead of away from it,—a very undesirable condition with low free-board vessels. In practice, vessels vary widely in their periods of oscillation. For a large vessel, perhaps the shortest period met with in practice would be that of a low-freeboard monitor, which, on account of its large metacentric height, may make a single roll from extreme inclination in one direction to the extreme in the other in from 2½ to 3 seconds, while a large vessel of small metacentric height may take as much as 20 seconds to the single roll. While rolling through small angles, say under 10°, the motion of a vessel is practically isochronous, that is to say, the period or time of completing a roll varies but little with the angle. This ceases to be true when vessels reach large angles of roll, say 30° or more. If there did not exist a retardation of roll in heavy rolling there would be grave danger of vessels, otherwise perfectly safe and seaworthy, being capsized by an accumulation of roll, every passing wave adding a little to the amplitude of roll,—well illustrated by the fact that with properly-timed impulses comparatively small forces will give large oscillations to a swinging weight. In actual practice, the skilled seaman can do much to limit excessive rolling by shaping the course of the vessel so as to produce complete lack of synchronism between the period of the ship and that of the waves. The naval architect, however, in the original design of the vessel utilizes the resistance of the water and provides "bilge" or "rolling keels," which aid materially in preventing heavy rolling. Bilge keels are projections at the bilge of the ship, approximately from one foot to three feet in depth, and extending usually for about half the length of the vessel and so situated when practicable as to offer maximum resistance to rolling. When properly fitted, bilge keels will often reduce the maximum angle of rolling, under adverse conditions, to less than half what it would be without them.

Speed and Resistance of Ships.—It has already been pointed out that an essential characteristic of all ships is mobility. The speed of a ship is a simple, concrete fact, readily appreciated by anyone and comparable with the speed of other ships; therefore, in many cases, it is considered the most conspicuous and important quality of a ship, whether man-of-war or passenger steamer. The keen interest taken by the general public in the speed records of passenger steamers engaged in trans-oceanic service fully illustrates this fact. The present accepted methods of determining the power necessary to drive a given ship at a given speed, and, conversely, the form of ship best adapted to be driven by a given power, are of comparatively recent development and largely due to the late William Froude, who, through an elaborate series of experiments, established the truth of the fundamental laws upon which are based the present theories of the resistance of ships. The resistance of a given ship, moving at a given speed, is made up of three main factors: first, the skin friction of the water on the surface of the ship. This is dependent only upon the surface exposed and the speed of the ship. It varies slightly with variation of form, due to this variation affecting the velocity of the water over the hull, but this variation is too slight to be taken account of in practice. The second element of resistance is what is called "wave-making resistance," due to the fact that a ship in moving through water produces waves and the force required to produce these waves proportionately reduces the power available for propulsion and thus, in effect, increases the resistance to the motion of the ship. The third element is what is called "eddy making," due to eddies of the water behind square corners of the hull and attachments, such as stern-post, propeller strut, etc. The eddy-making resistance is, however, comparatively small. The skin frictional resistance of a ship can be readily calculated with sufficient accuracy from the results of experiments upon the friction of plane surfaces drawn through water at known speeds. Mr. Froude demonstrated that the remaining resistances (wave and eddy making) of a full-sized ship could be estimated with great accuracy from a careful determination of similar resistances experienced by a small model of a ship when towed at a speed corresponding to the desired speed of the ship, the corresponding speeds of model and ship being in the ratio of the square roots of their linear dimensions. For a ship 500 feet in length, and a small model 20 feet long, the ratio of linear dimensions is 25; so that the actual speed of the model corresponding to 20 knots for the ship, would be $20 \div \sqrt{25}$, or 4 knots. By model experiments, also, it is comparatively easy to investigate the general effect of changes in shape and dimensions of vessels without having recourse to experiments with full-sized ships. The principles applied in passing from models to full-sized ships were also applied by Mr. Froude in passing from one full-sized ship to another,—being quite applicable if the two ships are similar, and applicable with fair approximation if the two ships are reasonably similar in proportions and shape.

Model Basins.—Experimental model basins are now found in nearly all shipbuilding countries. That of the United States is located at Washington. It is about 500 feet long, and, at its maximum section, the water is about 42 feet wide and 14 feet deep. Wooden models 20 feet long, made by special machinery, are used in this experimental work, the model being towed back and forth through the water by an electrically-actuated carriage which spans the basin. When erected in 1899, this was the largest experimental basin in the world. Later experimental basins built in Germany, however, are somewhat longer but not so deep or wide. From data obtained with models towed in the experimental basin, the effective horse-power, as it is called, necessary to tow the full-sized ship without engines, is determined with great accuracy. It is therefore necessary to establish, from actual trials, the relationship between this effective horse-power and the indicated horse-power which the ship's engines must exert.



UNITED STATES BATTLESHIP CONNECTICUT.

Length over all, 456 ft. 4 in. Length on load water line, 450 ft. Breadth, extreme, 76 ft. 10 in. Mean draft to load water line, 24 ft. 6 in. Maximum draft at full load, 26 ft. 9 in. Displacement to load water line, 16,000 tons; full load, 17,770 tons. Freeboard, minimum at full load forward, 18 ft. 3 in.; aft, 17 ft. 9 in. Bunker capacity, 2,200 tons. Tons per inch at load water line, 63.16 tons. Number of engines, 2; type, vertical triple expansion. Diameter cylinders: H. P., 32½ in.; I. P., 53 in.; L. P., two of 61 in. Stroke, 48 in. Number of screws, 2. Number of boilers, 12; type, Babcock & Wilcox. Grate surface, total, 1,077 sq. ft.; heating, 52,752 sq. ft. Steam pressure, designed, 250 lbs. at engines, 265 lbs. at boilers. Designed speed, 18 knots, at a trial displacement of 16,000 tons. Indicated horse power, 16,500. Complement, 42 officers, 701 men.

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This ratio depends upon the friction of machinery, efficiency of propellers, and to some extent upon the shape of the stern of the ship, and other minor factors; it is found, in practice, that it ranges from .50 to .60, although there is seldom reason why it should not be made as great as .55, a lower value being usually due to mistakes in design of hull, unsuitable propellers, or some such cause. The tabulated data obtained from experiments with models in the experimental basin, supplemented by progressive trial data taken under actual seagoing conditions, from the full-sized ships, have in recent years greatly aided the naval architect and the engineer in their design work, and the profession at large is under many obligations to the late William Froude and to his eminent successors in this work, among the most conspicuous of whom are R. E. Froude, in charge of the British Admiralty Experimental Tank at Haslar, and Naval Constructor Taylor, U. S. N., in charge of the U. S. Naval Experimental Tank at Washington, D. C., the writings of both of whom are generally recognized as valuable contributions to the literature of naval architecture.

Materials Used in Shipbuilding.—As the development of naval architecture has been largely influenced by the materials used in ship construction, brief allusion to these materials seems appropriate. The material used in the construction of ships underwent, broadly speaking, two changes during the 19th century: a change from wood to iron, which dates approximately from about the middle of the century, and a change from iron to mild steel, which dates from about 1880. Wood is still used as material for shipbuilding, many coasting vessels, for instance, in the United States and elsewhere being still built of wood; but the number and importance of wooden ships, as compared with those of iron and steel is diminishing yearly, and, at the present date, it may be said that the only structural material of importance for the construction of ocean-going ships is steel. Open-hearth steel, suitable for shipbuilding purposes, with an ultimate tensile strength of about 60,000 pounds to the square inch and an elongation in an 8-inch specimen of from 20 to 25 per cent before rupture, was introduced between 1870 and 1880. It was practically unknown in the United States in 1880. The contractor for the first steel vessels of the new Navy, which were contracted for in 1883, had to make special arrangements for the domestic manufacture of the steel needed in his work, and had to pay for it at that time about 7½ cents per pound. The growth of the manufacture of this material in the United States since that date, however, has been astonishing, mild steel of nearly the same characteristics as that used for ships being used in large quantities for bridges, houses, and other structures, so that, about 1900, its price had fallen as low as 1½ cents per pound, as compared with 7½ cents per pound some 15 years earlier. The qualities of the steel used in shipbuilding vary little in the different shipbuilding countries, being prescribed, as a rule, for merchant ships, by the marine insurance societies. For men-of-war, a somewhat higher grade of material is prescribed, and the inspection is rather more rigid. Coincident with the development of iron and steel as materials for shipbuilding, there began to develop an increase in the size of ships, due to the greater strength of the material of construction, and probably also to the fact that the use of steam instead of sails for propulsion, made it possible to increase the propulsive steam power of the large ships when it would not have been possible to add correspondingly to their sail area. The tendency towards an increase in size has been very marked since 1885, until now ships have reached sizes and dimensions limited only by the draft of water and the docking and wharf facilities available in the ports to which they trade.

The present state of development of naval architecture is probably best illustrated by examining the characteristics of some of the most recent products of shipbuilding skill in this country as exemplified in the principal characteristics of the United States battleship Connecticut and the trans-Pacific liner Minnesota, which are representative of our latest American designs of men-of-war and merchantmen. Commercially, it is found that the large steamer will carry freight or passengers cheaper at the same speed, or faster for the same cost, than the small steamer. The large man-of-war, on the other hand, is able to carry a much greater weight of armor and armament and can maintain a higher sustained sea speed than is practicable in a vessel of small displacement. See WARSHIPS.

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D. W. TAYLOR, U. S. N.,
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Naval Cadet. See NAVAL ACADEMY, UNITED STATES; NAVAL SERVICE.

Naval Construction. See NAVAL ARCHITECTURE.

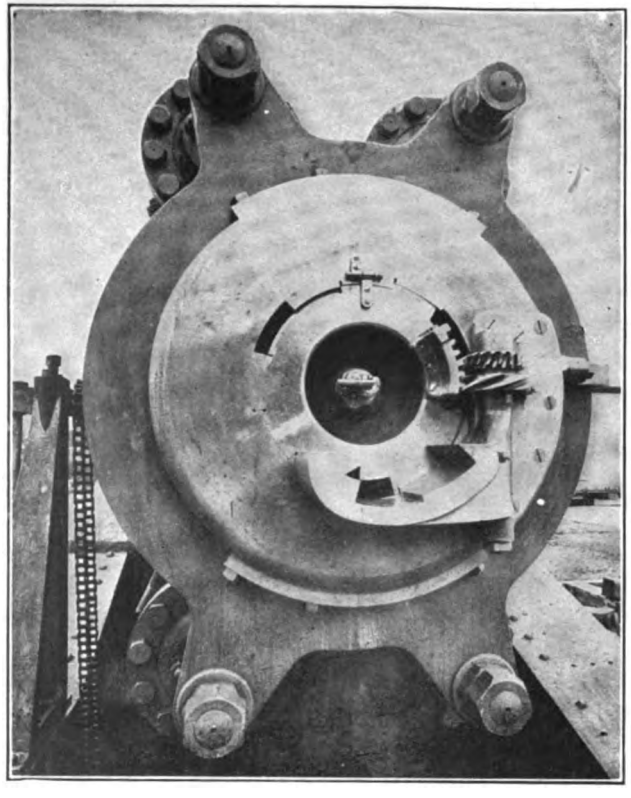
Naval Constructors are officers of the United States Navy, detailed to look after the designing, building, and repairing of warships. At every navy yard there is generally a naval constructor on duty. These officers are chosen from Naval Academy graduates and are prepared for their work by special education at technical schools. In 1902 there were 21 constructors and 20 assistants.

Naval Fleet. In times of war almost every known type of vessel is brought into action and comprises a part of the naval fleet. A squadron is usually a group of vessels of the same general build and character, as for instance a battleship with a force of cruisers, under the general command of an admiral. A fleet may include several commanders and all classes of vessels. These may be battleships, cruisers, monitors, torpedo-boats, destroyers, gunboats, submarines, tugs, colliers, transports, hospital ships, repair ships, distilling vessels, and refrigerating ships. Some of the last named craft are almost indispensable to a well equipped war fleet. A repair ship is an important adjunct and is fitted up like a machine shop, carrying spare plates, tools, and extra portions of machinery. She has forges, punching machines, etc., for repairing damages, and carries a crew composed to a large extent of machinists and iron shipwrights. The hospital ship is fitted with wards, operating rooms, modern appliances

for surgical operations, and for caring for the sick and carrying a large corps of trained nurses. In the United States navy this ship is painted white and flies the Red Cross flag, so that the foe may know her mission is sacred. She is absolutely unarmed. Most important, however, of these auxiliaries is the collier. A collier carries nothing but coal, everything being sacrificed to make room for bunkers and the machinery to take in and eject coal most expeditiously. The refrigerating ship carries an ice manufactory on board and immense cold-storage rooms for carrying fresh food. See NAVY OF THE UNITED STATES, THE.

Naval Guns. Gunpowder cannon for naval purposes appear to have been first used in the Orient. Old Japanese paintings of the 13th century depict naval combats between Chinese and Japanese fleets, the vessels being enveloped in the smoke from cannon. Among the Europeans, cannon began to be used at sea in the latter part of the 14th century. At first, galleys carried one gun, mounted in the bow and called a "corsiere"; later, sailing vessels carried small bombards mounted on the upper decks, which fired stone shot over the rails. Early in the 15th century, gun-ports were invented by the French, resulting in an increase of the number of guns carried, and before the end of the century, ships carrying as many as 60 guns each had been built by both the English and the French. From specimens still extant, it appears that these cannon were either constructed of wrought-iron or made of cast-brass; that they were sometimes of considerable length, and that some of them were breech-loaders. The guns of the Mary Rose, sunk in action with the French off Spithead, in 1545, were recovered in 1836. Some of them are of cast-brass, while the others are wrought-iron breech-loaders from 8 feet 6 inches to 11 feet in length, and from 5 to 8 inches in calibre. In loading these guns, the breech-piece was removed and the powder-charge placed in its forward end; the shot was inserted in the gun, and the breech-piece was replaced and held in position by a wedge from the rear. The difficulty of effectually closing the breech, however, appears to have caused a general abandonment of breech-loaders about the earlier part of the 17th century, and a reversion to muzzle-loaders made of cast iron and brass; inducing simple, rapid, and cheap methods of construction, which were steadily adhered to, during the following three hundred years. In the matter of projectiles, stone shot were gradually superseded by those of cast iron, while even rifling appears to have been attempted to obtain power and accuracy of aim. A rifle gun bearing the date of 1547 is one of the curiosities in the Woolwich arsenal, England. It is rifled with six grooves of a uniform twist of one turn in 26 inches. The extent of the use of guns at sea about the close of the 16th century is shown by the record of the armament of the "Invincible Armada." It was composed of about 140 ships, carrying a total of about 3,000 guns, most of which were small — 4, 6, and 10-pounders. A few of the larger vessels, however, were better armed. The largest ship, the San Lorenzo, carried a total of 50 guns, varying in size from 4 to 60-pounders; while the Triumph, the largest vessel of the opposing English fleet, carried a total of 68 guns of about the same size. During the 17th century, the size and gun-power of individual ships was greatly increased. In 1737, the first English three-decker, the Royal Sovereign, carrying 150 guns, was built. Up to the beginning of the 18th century, the tendency in gun construction was to produce long guns of small calibre, under the impression that the range increased with the length of the gun. The advantages of the larger calibre in close engagements, however, were gradually recognized, and resulted in the production of the "carronades," which were the most effective naval guns of that period. (See ORDNANCE.) The entire battery of the Victory, Nelson's famous flag-ship at the battle of Trafalgar, amounting to a total of 102 guns, was composed of carronades varying in size from 32 to 68-pounders. They were mounted on wooden truck carriages, and were given elevation by handspikes applied under the breech, a quoin or a wedge-shaped piece of wood being pushed in to hold the breech up in position. They were trained by handspikes with the aid of side-tackles, and their recoil was limited by a stout rope called the breeching, the ends of which were secured to the sides of the ship. At this time the slow match was commonly used for firing, and sighting was effected by looking along the exterior, or "line of metal" of the gun. Flint-locks were first applied to naval guns about 1780. The advantage of their use was appreciated in the sea-fight off Dominica, 12 April 1782, when the English fleet under Rodney defeated the French fleet under Comte de Grasse. In this action, Rodney's flag-ship, the Duke, carried guns fitted with flint-locks, and rendered such efficient service that they were applied to all guns and continued in general use up to about 1840, when they were superseded by percussion locks. Percussion locks were first introduced about 1828, when they were fitted to the guns of the United States frigate Vandalia, but their general use in the United States navy commenced about 1842, about 10 years later than their adoption by the French; while the English adhered to the flint-locks up to 1845. Improvements in sighting appear to have been first made by the English about the beginning of the 19th century. Fixed-sights were adopted by them in 1802, but they were superseded by the movable rear-sight invented by the French, some time later. About this time the Bomford "columbiads" were introduced and were found to be very effective as naval guns, and were followed in 1822 by the "Paixhans guns" which were quickly introduced in all navies. They were of considerable length, had long and narrow powder chambers, and fired solid shot and explosive shell at high velocities. Their introduction practically compelled the adoption of armor for ships. (See ORDNANCE.)

The creation of armored ships initiated the struggle for supremacy between guns and armor, which has continued up to the present time with unabated vigor, and caused the development of the high power rifled guns. The first of these were cast-iron muzzle-loading rifles and were used by the French and the English in the Crimean war. They showed such marked superiority over the smoothbores, that rifled guns were generally adopted by the various European countries, and persistent efforts were made, especially by Krupp in Germany, to perfect a breech-loading type. (See ORDNANCE.) In the United States, greater attention was paid to the



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BREECH MECHANISM OF TWELVE-INCH BREECH LOADING RIFLE.

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production of a better class of high power smoothbores. The "Dahlgren" guns were brought out in 1856, and were unquestionably the best naval guns at that time, comparing favorably with the rifles of contemporary European make. They were followed by the "Rodman" guns, also smoothbores, which were superseded by the built-up wrought-iron and steel rifles, only when the demand for stronger material to resist the greater pressures developed, forced the rejection of cast-iron for that purpose. (See ORDNANCE.) The introduction of rifled guns was slow, and was attended by pecuniary and other difficulties. The "Parrott" rifles, built to meet the exigencies of the Civil War, were not capable of further development, and although used to some extent on ships, were not considered satisfactory for naval purposes. The lack of funds for the construction of modern guns on the lines developed by foreign private concerns, together with the desires of all countries to utilize in some way the large number of smoothbores in their possession at that time, compelled the adoption of makeshift methods to convert smoothbores into rifles, and postponed the development of truly modern gun construction until 1885. (See ORDNANCE.)

The greatest progress, however, has been made since 1898. This is best illustrated by the accompanying drawings showing the development of the 6-inch gun, from 1883 to 1901. The old gun 30 calibres in length, delivered its 100 pound projectile, with a muzzle velocity of 2,000 feet per second, while the velocity given by the latest type is 2,900 feet per second. This increase is due to its larger powder chamber, bigger charge, and the slow combustion of the powder and sustained acceleration of the projectile in its longer bore of 50 calibres. It will also be noted, that in spite of the great increase in length and weight, the new gun is of simpler construction, consisting of only six separate pieces, as against twelve pieces in the older form; while greater transverse strength is obtained by the substitution of a long jacket and a few long hoops for the large number of short hoops formerly employed. Modern naval guns are "built-up" steel rifles, capable of firing solid shot, or explosive armor-piercing shells, at high velocities and with great powers of penetration. (See ORDNANCE.)

The following table gives the weights and dimensions of the latest guns of the United States Navy; also the character, velocity, and the powers of penetration of the projectiles, and will serve to represent naval guns in general:

All of them are breech-loaders, and are equipped with rapid-firing breech mechanisms up

TABLE OF ELEMENTS OF LATEST TYPES OF NAVAL GUNS (MODELS OF 1899), GIVING PERFORATION OF FACE-HARDENED ARMOR, SERVICE VELOCITIES, AT RANGES UP TO 3,000 YARDS, WITH SMOKELESS POWDER, CAPPED AND UNCAPPED, ARMOR-PIERCING PROJECTILES, AT NORMAL IMPACT.

Calibre of Gun	Weight in tons	Length in calibre	Approximate charge of smokeless powder for maximum velocity	Weight of projectile	Muzzle velocity	Muzzle energy	Perforation at muzzle — Krupp armor — Projectiles	
							Capped	Uncapped
			Lbs.	Lbs.	Ft.-secs.	Ft.-tons		
3-in., Mark I.....	0.87	50	5	13	2,800	709	4.4	3.6
4-in., Mark VII....	2.56	50	15	32	2,900	1,870	6.4	5.6
5-in., Mark V.....	3.3	50	27	60	2,900	3,503	8.4	6.6
6-in., Mark VI.....	8.37	50	46	100	2,900	5,838	10.9	7.3
7-in., Mark I.....	13.33	45	74	165	2,900	9,646	13.2	10.5
8-in., Mark V.....	18.	45	115	250	2,800	13,602	15.	12.1
10-in., Mark III....	33.4	40	240	500	2,800	27,204	20.	17.1
12-in., Mark III....	52.	40	385	850	2,800	46,246	25.	21.7

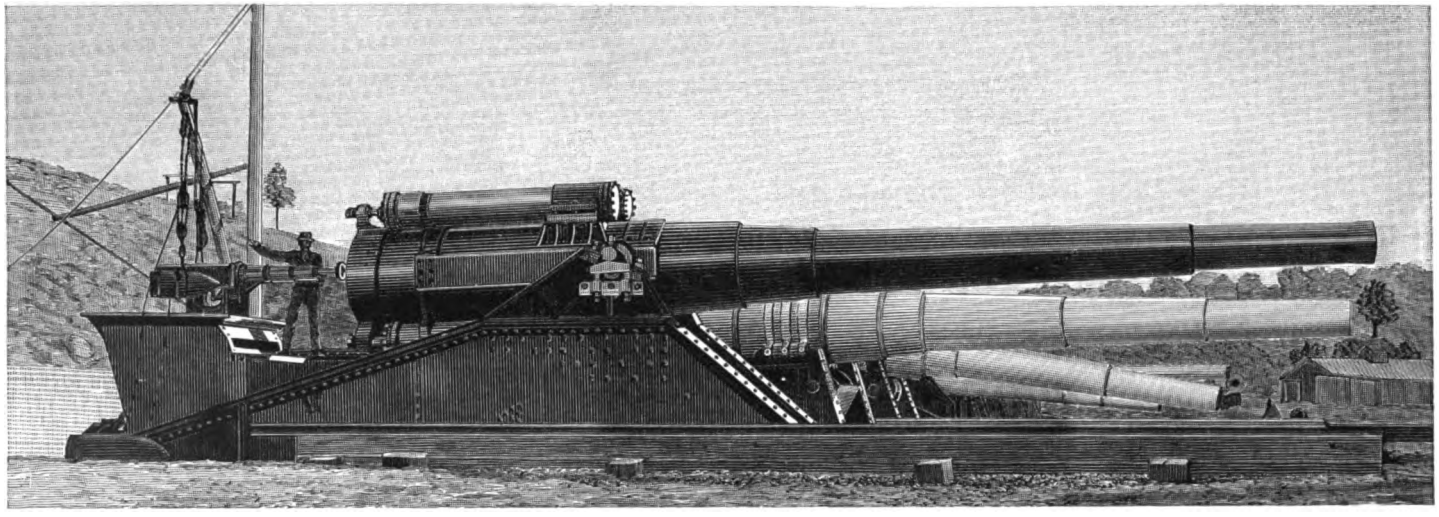
Calibre of Gun	Remaining velocity at 1,000 yards	Perforation at 1,000 yards — Krupp armor — Projectiles		Remaining velocity at 2,000 yards	Perforation at 2,000 yards — Krupp armor — Projectiles		Remaining velocity at 3,000 yards	Perforation at 3,000 yards — Krupp armor — Projectiles	
		Capped	Uncapped		Capped	Uncapped		Capped	Uncapped
3-in., Mark I.....	2,130	3.1	.....	1,620	.....	.....	.....	.....	.....
4-in., Mark VII....	2,380	5.2	4.4	1,955	4.	3.4	1,605	3.2	.....
5-in., Mark V.....	2,460	6.7	5.6	2,085	5.5	4.7	1,770	4.6	4.6
6-in., Mark VI.....	2,525	8.8	6.8	2,185	7.2	6.	1,895	5.9	5.2
7-in., Mark I.....	2,580	11.4	8.9	2,295	9.7	7.6	2,040	8.3	6.5
8-in., Mark V.....	2,530	13.2	10.4	2,390	11.7	9.1	2,070	10.3	7.9
10-in., Mark III....	2,585	18.3	15.	2,390	16.5	13.5	2,210	15.	11.5
12-in., Mark III....	2,620	23.	19.4	2,450	21.2	17.9	2,295	19.5	16.2

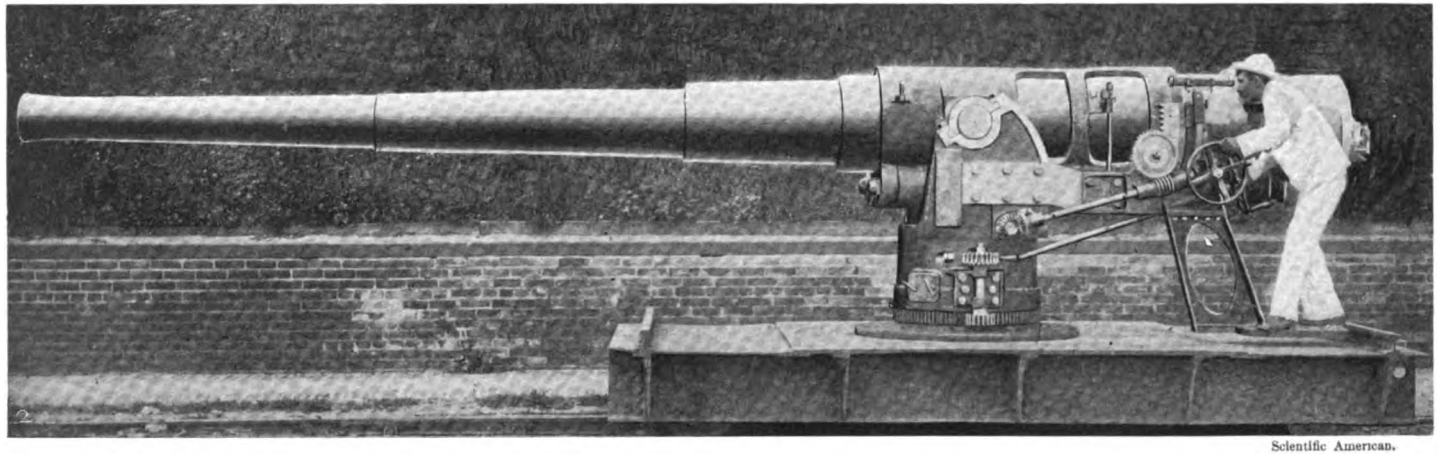
to and including those of 8-inch calibre. (See ORDNANCE.) In their design a maximum of efficiency with a minimum of weight is obtained, while the calibre selected is controlled to a great extent by the conditions of their service. The largest guns ever placed on board ship were the Armstrong 110-guns, of the English battleships, Sanspareil, Benbow, and Victoria. They were of 16.25-inch calibre. Many 13.5-inch guns are still used in the English and French navies, and some 13-inch guns in the naval service of the United States, but guns exceeding 12 inches in calibre are not being made for any naval service at the present time. In addition to these larger types, naval armaments include the various forms of rapid-fire and machine guns of smaller calibre, and greater speed of fire, but their precise value as naval weapons is a matter of some controversy. The rifling of naval guns is of the poly-groove type (see ORDNANCE); their projectiles are either of the capped or uncapped variety (see PROJECTILES); and they are fired by electric, percussion, combination, or friction primers. The electric, or the percussion primer, consists of a small copper tube about one and one-half inches in length, with an enlarged head. The electrical contact with the firing circuit is by means of a small projecting wire, while the percussion contact with the powder-charge is a small cap in the head of the primer. The combination primer consists of a small metallic shell somewhat like that of a centre-fire cartridge, containing the priming composition, and fitted with a cap that is insulated from the shell. This cap, if struck, will explode and ignite the powder-charge, or it may be worked by an electric contact; in which case, the current passing through the cap, heats to incandescence the bridge of fine platinum wire connecting the cap with the shell, and thus ignites the composition which explodes the powder-charge in the gun.

The methods of construction, and systems of loading applied to naval guns, are similar to those generally employed in the production and operation of the larger types of ordnance. In the United States navy, all of the guns are equipped with the "interrupted or slotted screw" breech mechanism, improved by the "Welin" patent breech-plug, the rights for which were purchased from the Vickers-Maxim firm, at a cost of several hundred thousand dollars. In this plug, the screw-threads are cut in steps of varying radius in the several sectors, instead of uniform radius with alternate blank and threaded sectors, as in the older form. By this method the amount of the plug cut away is reduced, also the depth of the plug, and consequently the distance it has to be pushed in before it is fully inserted. In all guns up to and including those of 7-inch calibre, the breech is opened with a horizontal lever, one sweep of which unlocks the threads, withdraws the plug, and swings it clear of the breech. (See illustration of breech mechanism of new 6-inch rapid-fire gun.) In the 8-inch rifle and all larger calibres, the breech is opened with a crank, as the plug is too heavy and the swing too great to be operated by a lever. The time consumed in opening and closing the breech, however, is but a small fraction of that required to serve the gun, its loading and pointing are the operations that take the most time.

In the 12-inch gun, the continued turning of the crank rotates and unlocks the plug, withdraws it, and swings it around to the right side of the breech. To open or close the breech requires seven and one-half turns of the crank, easily performed in less than five seconds. The mechanism of the 8-inch gun is practically the same, but being lighter is handled more quickly.

Mounts and Carriages for Modern Naval Guns.— The first important step in the development of modern gun mounting, was the employment of hydraulic cylinders to check the recoil. Very large guns requiring power for their operation, are mounted in turrets or barbettes, and their carriages, until within the last few years, were built on the system originally installed on the English ship Thunderer, in 1877. This type of mounting as used on the first modern armored ships of the United States Navy, consists of a steel slide pivoted to the turret at its forward end, and supported by a hydraulic ram at the rear. This slide carries a movable saddle to which the gun is secured by steel straps, the forward part of the saddle being attached to the piston rod of a hydraulic cylinder secured between the slide rails. Shallow grooves, decreasing in width toward the rear, are cut in the walls of the cylinder. When the gun recoils, the water is forced from the rear side of the piston through the grooves to the front side, absorbing the energy of the recoil and stopping the gun after it had recoiled a distance of about four calibres. A pipe conveys water from a pumping system below the recoil cylinder, entering by an automatic valve which closes when the pressure in the cylinder exceeds the pressure in the hydraulic system. When the gun recoils this valve closes, but opens as soon as the recoil is checked, so that the water pressure returns the gun to battery at once. For loading, the slide is dropped, usually to the position of extreme elevation; a three-storied ammunition car, carrying the projectile in the upper compartment, and half the powder-charge in each of the others, is hoisted in line with the breech by a hydraulic cylinder actuating a wire-rope purchase, and the three parts of the load are pushed into the gun successively, by a hydraulic rammer. The turrets are turned by either steam or electric motors situated on the deck below the turret floor, which operate a pinion geared into a rack fixed to the turret. Since 1880 greater progress has been made in gun-mountings than even in the guns themselves. The first small rapid-fire guns were mounted on tripods, or cone stands, and had no recoil; the shock of the discharge being absorbed by the elasticity of the supports; but, as these guns increased in size and power, it became necessary to allow them recoil, and to do this without greatly reducing their speed of fire, the "cradle" mount was devised This form of mount, now used for all naval guns, consists of a frame or sleeve mounted on trunnions, in which the gun is so fitted that it can slide back and forth. The recoil is checked by hydraulic cylinders, and the gun is returned to the firing position by the expansion of springs compressed by the force of the recoil. As the trunnions are on the sleeve and not on the gun, elevation or depression is given by turning the whole combination of gun, sleeve, recoil cylinders, and counter-recoil springs, around the axis of the trunnions. "Cradle mounts" are also known as "balanced spring return mounts," a designation derived from the fact that in them,





Scientific American.

1. Twelve-inch breech loading rifle, coast defense mounting.
2. Six-inch rapid-fire, breech loading rifle.

Main

the sleeve is balanced at its centre of gravity which coincides with the position of the axis of the trunnions, instead of being supported by a pivot in front and a ram at the rear, as in the older form. All of the guns in the United States Navy, from the 3-inch to the 8-inch calibres, inclusive, recoil in the oscillating sleeve. The recoil of the 8-inch gun is 24 inches, of the 7-inch 21 inches, of the 6-inch 15 inches, and of the 5-inch 11.5 inches. Guns of and below the 7-inch calibre, are mounted on pedestal mounts, turn on ball bearings, and are balanced (at the centre of gravity) in their sleeves. They are worked by the hand and can be elevated or depressed with great ease. In the case of the 6-inch and 7-inch guns, the gun pointer stands on a platform attached to the sleeve and turning with the gun. He is, therefore, unaffected by the recoil and is able to keep the gun steadily upon the target. His position, with his hands on the traversing and elevating hand-wheels, and with his eye at the telescopic sight, is shown clearly in the photograph of the 6-inch gun. All guns above the 3-inch calibre are fitted with telescopic sights, also with open day and night sights, and with electric and percussion firing gear. The recoil of the 12-inch gun, is taken up by four hydraulic cylinders placed symmetrically around the gun, but attached to the sleeve or non-recoiling part. The pistons are attached to a yoke on the breech of the gun. In the 12-inch guns of the Maine and her class, and for the monitors, the recoil is 33 inches. Each recoil cylinder contains a series of heavy triple springs, about 1 ton in weight, which are put into them under an initial tension sufficient to prevent any movement of the gun when the ship rolls, or when it is elevated to its maximum limit. Upon discharge, these springs are still farther compressed by the force of the recoil, and in expanding exert sufficient force to return the gun to the firing position as soon as the recoil is checked. As this force is sufficient to return the gun to battery at extreme elevation, it exceeds the force necessary to return the gun at level. This excess of energy is counteracted by a hydraulic buffer, or counter-recoil check, fitted into the front end of each cylinder, which prevents the gun from being run out violently, and brings it to rest gradually, as it runs out.

The increased speed of fire of modern naval guns is chiefly due to the improved gun-mounts and breech mechanisms described in the foregoing text. The consequent enormous increase in the power of battleships is clearly illustrated by the above table, which gives a comparison of the total energy of fire of the United States battleship Oregon in 1898, with that of the Georgia launched in 1903. The Georgia is a larger vessel; but while the increase in displacement is 40 per cent, the increase in energy of fire is about 340 per cent. This increase, however, is due as much to the greater muzzle energy developed by the new guns as to their increased speed of fire.

The rates of fire given in the table may appear to be very low, but they represent practical and not ideal values. Rates of fire as high as 8 aimed shots per minute, from a 6-inch gun, all of which struck a target 15 feet high, at a range of 1,500 yards, are of record, but the conditions under which they were attained were undoubtedly ideal. Under actual battle conditions, even the rate of 3.5 rounds per minute given in the table, could be maintained for a few minutes only, as the heating up of the gun alone, would necessitate a rest. In this connection, the «life» or period of effective use of modern guns may be considered briefly, with advantage. Various explanations have been offered for the erosive effects of the escaping powder-gas on the surface of the bore. Some authorities claim that it is of a chemical nature, while others are of the opinion that it is a mechanical action of a scouring character. It is true that a great deal of the injurious effects of gas erosion has been partially eliminated by the use of effectual gas-checks, but what appears to be the principal attendant cause — the high temperature of combustion of the powder-charge — still remains, and indicates the proper direction in which experiments should be made to overcome those effects completely. Large charges of brown powder erode the bore very rapidly. Smokeless powder containing a large percentage of nitroglycerine, such as «cordite,» exerts an erosive action, so rapid that a gun is practically worthless after firing 70 or 80 rounds. On the other hand, the use of pure guncotton smokeless powder, such as used at present by the United States, France, and Russia, in which the temperature of combustion is not only lower than that of nitroglycerine, but is even lower than that of ordinary gunpowder, shows a decrease of erosive action to a marked degree. In a 3-inch gun, tested at the Indian Head proving grounds, 450 rounds were fired without impairing its accuracy.

It is undoubtedly true that the heating of the gun in rapid firing, in addition to the high temperature of combustion, increases the wear, especially in those of the smaller calibres — 6-pounder and the 3-inch class. In the case of the gun just mentioned, at the end of 450 rounds

COMPARISON OF TOTAL ENERGY OF FIRE IN FIVE MINUTES OF BATTLESHIPS OREGON (IN 1898) AND GEORGIA.

Oregon in 1898				Georgia			
Gun	Muzzle energy of Gun	*Rate of Fire per Minute	Muzzle energy in Five Minutes	Gun	Muzzle energy of Gun	*Rate of Fire per Minute	Muzzle energy in Five Minutes
	Foot-tons		Foot-tons		Foot-tons		Foot-tons
4 13-inch.	33,627	0.4	269,016	4 12-inch	46,246	0.66	610,447
8 8-inch.	8,011	1.0	320,440	8 8-inch	13,602	1.2	652,896
4 6-inch.	2,990	2.0	119,600	12 6-inch	5,838	3.5	1,225,980
20 6-pounders.	138	8.0	110,400	12 3-inch	709	6.5	276,510
Total energy all guns in five minutes,			819,456	Total energy all guns in five minutes			2,765,833

of slow firing it was practically as good as new, but it was completely destroyed, by the wearing away of its rifling, in one hour, by firing it at the rate of two rounds per minute.

Bibliography.— Specific information on naval guns, may be obtained from the following named publications: Annual Reports of the Office of Naval Intelligence; Annual Reports of the Chief of the Bureau of Ordnance, U. S. Navy Department; Ingersoll, 'Text-Book on Ordnance and Gunnery'; Proceedings of the United States Naval Institute; The Naval Pocket-Book; Brassey, 'Naval Annual'; 'Engineering' (London, current); 'Scientific American' (New York, current).

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Naval Institute, United States, an organization founded in 1873 at Annapolis, Md., by the officers of the Naval Academy. It issues quarterly 'Proceedings' on naval affairs. Each year the Institute offers a life membership, a gold medal, and a prize of $100 for the best essay or paper of interest to the naval service. The present membership includes two thirds of all the officers of the navy.

Naval Law. See LAW, MILITARY.

Naval Maneuvers. See ARMY AND NAVY MANEUVERS.

Naval Militia, armed organizations instituted by many of the States, under an act of Congress, forming a part of the State militia. The duty of the naval militia in time of war is to man the coast and harbor defense vessels, thus leaving free the regular force to carry on offensive operations at sea. Historically the first step may be said to have been taken by the introduction by Senator Whitthorne of a bill in the United States Senate on 17 Feb. 1887, "To create a naval reserve of auxiliary cruisers, officers, and men from the mercantile marine of the United States." This measure did not become a law, but as a result the Navy Department in 1887 prepared a plan of organization for a naval militia force based on a battery of 18 petty officers and men as a unit. The legislature of Massachusetts passed an act, which was approved 17 May 1888, establishing "a naval battalion to be attached to the volunteer militia." This was really the pioneer measure in the United States, but the organization under it was not completed till 25 March 1890. The State of Pennsylvania, under an act approved 26 April 1889, made provision for the establishment of not less than four companies, "to constitute a battalion to be known as the Naval Battalion of the National Guard of Pennsylvania." On the same day the legislature of Rhode Island "established a naval battalion to be attached to the Rhode Island Militia." The legislature of New York passed an act, approved 14 June 1889, to establish a State Naval Militia of three battalions of naval reserve artillery and a naval reserve torpedo corps to consist of not less than four companies to a battalion.

In 1890 little was done except in the way of perfecting the organizations in States which had passed laws. The Massachusetts Naval Battalion drilled on board the receiving ship Wabash and the New York battalion on board the receiving ship Minnesota. The year 1891 was, however, a most important one. On 2 March 1891, Congress appropriated $25,000 for arms and equipments for the Naval Militia, and in June the department issued regulations governing the disbursement of the fund pro rata, one allotment being paid on 1 July and a reserve allotted on 1 October. On 31 March 1891, an act was approved in California for a naval battalion. The governor of North Carolina granted permission for the formation of a battalion of naval artillery, to consist of not less than two batteries, as a part of the National Guard. No law was passed directly authorizing the establishment of a Naval Militia. In the same way the Galveston Artillery Company was ordered by the governor of Texas enrolled as a "battery for seacoast defense," and was recognized by the department as a Naval Militia force in Texas.

In 1893 the following States passed laws relating to the Naval Militia: North Carolina, Michigan, Illinois, Connecticut, and Georgia. In the regulations of the department governing the distribution of the annual appropriation for 1893 "only uniformed petty officers and enlisted men" were hereafter to be considered in making the apportionment, one half of the allotment due any State to be withheld until the governor shall inform the department officially "that a proper naval uniform has been adopted and issued to its Naval Militia." Notice was also given that all arms and equipment issued by the department should remain the property of the United States and should be receipted for and annually accounted for on blank forms furnished by the department.

The following table shows the number of officers, petty officers, and enlisted men in each State and in the District of Columbia on 1 Jan. 1901, as certified to by the governor of the State and by the brigadier-general commanding the District of Columbia militia:

STATE	Officers	Petty officers and enlisted men
California	36	380
Connecticut	20	185
District of Columbia	10	162
Florida	4	48
Georgia	17	111
Illinois	56	575
Louisiana	23	327
Maine	3	46
Maryland	18	221
Massachusetts	39	497
Michigan	17	183
New Jersey	32	322
New York	57	585
North Carolina	27	219
Ohio	22	234
Oregon	9	115
Pennsylvania	9	64
Rhode Island	12	181
South Carolina	24	224
Total	435	4,679

All matters relating to the naval militia come under the cognizance of the assistant secretary of the navy. The Navy Department transacts all its business with the naval militia through the governors and adjutants-general of the States.

The following table shows the allotment of appropriations to each State, in conformity with the regulations of the Navy Department:

State	Allotment
California	$4,846.90
Connecticut	2,359.68
District of Columbia	2,066.31
Florida	612.24
Georgia	1,415.81
Illinois	7,334.12
Louisiana	4,170.88
Maine	586.73
Maryland	2,818.85
Massachusetts	6,339.23
Michigan	2,334.17
New Jersey	4,107.11
New York	7,461.67
North Carolina	2,793.34
Ohio	2,984.67
Oregon	1,466.83
Pennsylvania	816.32
Rhode Island	2,308.66
South Carolina	2,857.12
Total	$59,680.64

Naval Observatory, The United States, is the youngest among the great astronomical institutions of the nation, but it has developed in a remarkably brief time into one fit to rank with Greenwich and Pulkowa. We hear less of it, however, than we do of many of the private institutions in this country, for its object is not the further discovery of the unknown, but the development and application of the known. Of course, the former is the more brilliant object, but it would undoubtedly incur an expense to the government greater than the value of the discoveries. When a discovery is made, if it is of any importance, it has to be followed up and elaborated upon before it can be made useful to mankind. Here comes the hard work which the world does not see and here the great majority of astronomers fail.

Recently great changes have occurred in the scientific staff of the institution by the retirement of the older professors, notably Doctors Newcomb and Hall, and the succession to their responsibilities of a younger staff, comprising Profs. Skinner, See, Updegraff, Eichelberger, Littell, and Prof. Harshman, Director of the 'Nautical Almanac.' It is remarkable that although in scientific achievement this country has led the way since its incipiency, it eked out the first 60 years of its existence, and attained some mighty marine achievements, practically without so indispensable an institution as a naval observatory. We depended on Greenwich, Pulkowa, and Paris, and on college observatories here almost entirely until 1842.

The Observatory was originally established in 1807, but little progress was made, and in 1832, the small building 16 feet square used for the purpose, contained but a single instrument. In that year a $25,000 appropriation was secured and a new building erected. Berlin, Paris, Greenwich, and Vienna presented some 200 rare volumes of the highest standard as a nucleus for an astronomical library. This branch has grown from that to one numbering 22,000 volumes and pamphlets, and stands to-day second to Pulkowa only. The institution grew rapidly, and in 1874 installed the largest telescope then in existence, the famous 26-inch equatorial. It was set in place just in time to observe the transit of Venus, which occurs but once in a lifetime.

Naval Order of the United States, an association composed of a General Commandery and commanderies in the States of Massachusetts, Pennsylvania, New York, and Illinois, and in the District of Columbia. The General Commandery meets triennially on 5 October, and the State Commanderies meet annually in November. The parent commandery, that of Massachusetts, was organized at Boston on 4 July 1890. The General Commandery was established three years later, on 19 June 1893. The members of the order are officers and the descendants of officers who served in the navy and marine corps in any war or in any battle in which the said naval forces of the United States have participated. The membership clause provides for two classes of members: First, veteran officers and their male descendants, and, second, enlisted men who have received the United States naval medal of honor for bravery in the face of the enemy.

Naval Reserve. See NAVAL MILITIA.

Naval Schools, institutions for the training of naval officers. In the United States the Naval Academy at Annapolis, Md., is the most important school of this character. In Great Britain the chief naval school is the Royal Naval College at Greenwich, an institution fully equipped for the teaching of all branches of theoretical and practical knowledge connected with the profession of a naval officer, including mathematics, physics, mechanics, chemistry, fortification, navigation, surveying, marine engineering, drawing, etc. For a detailed description of the Annapolis school see the article NAVAL ACADEMY, UNITED STATES; see also NAVAL SERVICE.

Naval Service, The. For a period of ten years after the close of the Civil War the officers of the navy met with many difficulties in keeping up the well-earned reputation of our naval vessels, because of the very inferior class of men composing the crews. The percentage of Americans in the service was small, and it was no unusual circumstance to have the powder division of a ship made up almost entirely of foreigners, who could neither understand nor speak the English language. This was because the division was generally composed of bandsmen, mostly Italians, and servants, who were usually French or Japanese. The intelligent officers of our navy could not be content with this anomalous condition of affairs, and constantly suggested improvements, many of which were from time to time adopted; but the betterment of our enlisted force was very gradual, and not until toward the dawn of the 20th century were the present high standards reached.

It must be remembered that the work of the navy differs from that of all other callings, by reason of the fact that nothing counts except results. In battle or in target practice, the shot that does not hit is absolutely wasted. The engine that cannot develop the speed for which it was designed may prevent a warship from performing the mission upon which she is sent. The officers who do not show efficiency and patriotism are not suitable representatives of their country in foreign harbors. The commander of a fleet or vessel who in time of emergency is wanting in diplomatic ability lacks

one of the essentials of a naval leader. In peace or in war, nothing but perfect discipline and the highest efficiency will suffice, and it is for this reason that the navy cannot content itself with indifferent work. It does not require a war to bring naval weakness to the attention of the country.

The whole aim and purpose of every man in the navy should be to cultivate strong and lasting friendships among his fellows, to influence men to be fearless in the discharge of their duty, and to do everything that will produce efficiency at all times. There is something in the naval life that helps to bring out the best a man has in him. The sea has a tendency to make all men feel their nothingness, and it is not surprising that where men have in common shared triumphs, endured perils, seen the wonders of the deep, and at times felt the presence of a stronger controlling power, they become bound by ties which make them love each other like brothers.

The new navy, as it has been called, means not only great engines and machines of war, and floating fortresses, but it means the proper training of young men for the profession of fighting upon the sea. While the early establishment of the Naval Academy had a wondrous effect upon the efficiency of the American navy, there had been felt for half a century a need for a preparatory system to properly fit young men for service in the enlisted force. It was about 1870 that the success of the apprentice system in some of the European navies became so marked as to indicate an effective solution of the problem of the education of sailors. So impressed was Secretary Robeson with the desirability of this system that in April 1875 he issued a circular directing that the education of boys for the navy should comprise only the elements of an English education, alternating with practical seamanship and other professional occupations designed to make of them sailors in the navy. In accordance with this idea, the two frigates Minnesota and Constitution and the sloops Portsmouth and Saratoga were commissioned as school and training ships. To-day the qualifications for admission as apprentices are almost identical with those of 1875, except that the limit of age at time of entrance has been raised, being now 14 to 18 years. Each boy must satisfy the recruiting officer that he is of robust frame, intelligent, of perfectly sound and healthy constitution, and that he is able to read and write. In special cases, where the boy shows general intelligence and is otherwise qualified, he may be enlisted even though his reading and writing are imperfect. Boys are enlisted on the receiving ships at the navy yards and are sent as soon after enlistment as practicable to one of the training stations maintained for their education.

In 1880 the people of Newport ceded Woonachasset, or Coaster's Harbor Island, to the State of Rhode Island, and in March 1881 the State ceded title and jurisdiction over the island to the United States, for use as a training station. In August of the following year Congress accepted "the cession by the State of Rhode Island to the United States of said island for use as a naval training station." The old ship New Hampshire was taken to Coaster's Harbor Island in 1881, was housed in, heated by steam, lighted by electricity, and fitted out for comfortably accommodating 500 apprentices. They slept in hammocks, assisted in keeping the ship clean, and in various ways were gradually accustomed to a nautical life. The daily routine began at 5:30, when reveille was sounded and hammocks were lashed and stowed. After an early breakfast the boys washed their clothes, scrubbed decks, and bathed. About six hours each day were occupied with studies and drills. Tattoo was sounded at 9 o'clock, when all boys were required to be in their hammocks.

As time has gone on, various changes have been made in the training of apprentices, but the results of the adoption of the apprentice system have been very satisfactory, and in recent years another training station has been established in San Francisco harbor, and another on the Great Lakes is contemplated. Three departments of instruction are maintained, namely, seamanship, gunnery, and English. The apprentice remains at the training station for at least six months, during which time, even with the very limited number of instructors, the average boy learns more about his future profession than the average landsman on a man-of-war does in a three years' cruise. Several line officers are attached to the training station, and supervise the discipline and instruction. Warrant officers give technical instruction in their specialties, and a chaplain looks after the moral training of the boys. Twice each year the boys are drafted to the training ships, which make summer cruises to Europe and winter cruises to the West Indies. Only half of the crews are changed at a time, and each apprentice remains on board for a year. This duty at sea is supposed to transform the boys into deep-water sailors. Their former instruction is continued, but the boys acquire, through their sea duty, development of physique, knowledge of sailing ships, perfect fearlessness, and activity in the performance of their duties. After the completion of their terms on the training ships, the apprentices are transferred to regular men-of-war, where their education is still continued; and when they have shown a proper aptitude they are sent to the Washington navy yard for a six months' course of instruction in gunnery. A limited number of them are afterward sent to Newport for an equal length of time, to be given a practical working knowledge of electricity and torpedoes. They then graduate into the service as seamen-gunners, and are insured petty officers' positions with much better pay.

The importance of the apprentice system, together with the thorough means taken to secure the best possible results at Annapolis, cannot be overestimated when it is considered that there must be assigned to every modern warship a large complement of highly trained and educated officers, as well as a skilled and resourceful crew. There must be among the enlisted force a large percentage of men who receive high pay and who are accorded respect and consideration. The average pay of men on board a warship is twice that received by troops in barracks or in camp. The opportunity for professional advancement is greater on shipboard than on shore. The man who possesses technical skill, application of purpose, and power of resource, will be certain of quick promotion and increased pay. The call for petty officers is always urgent, and nearly all commanding officers are willing to give high-class men ad-

vancement every six months, and in some cases at shorter intervals. Some of the warrant machinists now in the navy, receiving $1,500 per annum, secured their appointments in less than two years from the time they entered the naval service.

In 1901 Congress passed a law providing that a limited number of warrant officers having six years' service as such, and who could pass the examination prescribed by the Department, might secure commissions in the naval service. The opportunity presents itself, therefore, for an apprentice boy to rise, through the various positions in the enlisted force, to the line of the navy and eventually to become the commander of a fleet. A career in the navy gives every officer an opportunity to specialize along lines in which he may possess particular ability. The opportunity also presents itself, through travel and observation, to acquaint himself with the strength and weakness of other nations, to acquire their languages, and to read their literature. Moreover, service in the navy does not unfit either the enlisted man or the commissioned officer for a business career. There are now in civil life thousands of business and professional men who have served on American men-of-war.

Turning now to another viewpoint, it should be said that patriotism, love of the flag, and pride of country are in themselves sufficient to inspire a man to succeed in the American naval service. The War of the Revolution, the War of 1812, the Mexican war, the great Civil War, and the late Spanish-American war, all join in telling the story of the American navy. Immediately upon entering the service in any capacity, one feels instinctively the pride and glory of the history of our flag on the seas. He becomes a participant, in thought at least, in the victories of the past, and pride and patriotism find an abiding place in his heart. And as science in warfare advances, the man behind the gun, the man on the deck, or the man in the engine room, feels that he too is making advances no less important to him than the march of science and invention to the service and the country.

It was through the necessities of the Civil War that the impetus came for naval construction and the beginning of the evolution of the modern war vessel. A new era dawned for the Navy in 1883, when the Atlanta, Boston, Chicago, and Dolphin were laid down and became a nucleus for our present navy. Since then ships have been added on improved plans and with improved machinery. "A duel between guns and armor," as Rear-Admiral Melville has aptly termed it, has been constantly going on; and as fast as a ship is built and armored on plans far surpassing the preceding one, valuable improvements are suggested and adopted for her successor which render her relatively out of date. The latest American cruiser is a marvel. In speed, ability to keep the sea, and striking power, she is the equal of anything that floats. When we to-day compare our navy with those of foreign nations, it must be confessed that the comparison is a pleasing one from the standpoint of the United States; especially when we remember that comparatively few years ago our navy, in the modern sense of the term, did not exist. To-day the United States and Germany appear to be of equal strength, considered numerically; but when we look at the offensive and defensive power of the battleships which we now have under construction, it must be admitted that, in spite of the large building programme which Germany has in hand, the fighting strength of our navy is to-day a little greater than that of Germany.

With one of the best navies in the world, America demands the best men to man her ships,— men of character and sterling worth; and to such men the navy offers golden opportunities. And what is demanded of them in return? The first thing a recruit learns upon joining a naval vessel is the necessity of implicit obedience. The enlisted man who tries to do his duty suffers very little from the yoke of discipline. In fact, it is a protection to the man disposed to do his duty, since severe measures are only taken against those inclined to disobey established rules and regulations. Great changes have been wrought during the last thirty years, and therefore the new navy offers quite a different career from that which presented itself in the past, and one from which no American citizen need shrink. The naval man of the new age must keep all his senses on the alert; his ear must be trained to detect any variation in the rhythmic beat of the pistons and propellers; his eye must note any leakage of water or vapor or any change in conditions; his touch must be sensitive to the temperature of the working parts; and even his tongue must be a monitor in helping to maintain the freshness of the water in the boilers. The old organization passed away with the old ships, and, as President Roosevelt has said, "the naval officer of the future must be a fighting engineer." Therefore a career in the navy, for the majority of those who are connected with the service, must be along mechanical lines. The naval conflicts of the future will doubtless be short, sharp, and decisive. Men of intelligence, quickness, alertness, and resource, rather than of great brawn and muscle, are needed on the forecastle as well as in the cabin and wardroom; below decks as well as in the conning tower; in the lowest position as well as in the most exalted office. And every man, performing fearlessly the duty assigned him, will remember that wherever he goes there floats over him the flag of "Old Glory" that must at all times and forever be honored, revered and loved.

GEORGE DEWEY,
Admiral of the Navy.

December 7, 1903.

Naval Signals. See SIGNALS, NAVAL.

Naval Squadron. See NAVAL FLEET.

Naval Stores, or **Ship Stores,** a general term used in commerce and in the merchant marine, for certain products of the pine tree, including spirits of turpentine, resins, pitch, tar, etc. The term is a misnomer in these days of steel and iron ships, as nine tenths of the product are used in other industries rather than in shipping. The name naval stores is derived from the consumption in early days of large quantities of pitch and tar in ship yards and on board of vessels. Nine tenths of the naval stores used throughout the world come from the long-leafed pine belt of the Southern States. The pine belt includes a vast territory commencing in North Carolina, near the Virginia State line, and extending southward to

Florida, along the Atlantic Coast line. The belt is from 5 to 100 miles wide and includes the States of North Carolina, South Carolina, Georgia, Alabama, Mississippi, and Louisiana. The territory embraces about 130,000 square miles. The other tenth of the world's supply comes from France and Austria.

Turpentine.— Spirits of turpentine is derived from the sap of the long-leafed pine and in its crude state is of a fine white color. Upon exposure to the air it becomes dry, hard, and brittle, thus forming resin. From 200 acres of pine trees there is obtained the first year about 280 barrels of crude turpentine, or dip; and 70 barrels of what is known as scrape. This distilled will give 2,000 gallons of spirits of turpentine and 260 barrels of resin. In the fourth and last year of the sap flow this output is reduced to 1,000 gallons of turpentine and 110 barrels of resin. In the days of the Civil War turpentine sold at $1.75 to $1.90 a gallon, as against the normal price of 28 or 30 cents; and inferior resin sold as high as $4 a barrel, the normal price being about $1.90. These Civil War prices boomed the industry in France for several years. (See TURPENTINE.)

Pitch.— The ordinary pitch of commerce is derived from a dry distillation of resin, and is largely used in calking wooden ships. (See TAR.)

Tar.— The variety of tar known as wood tar which is made from the pine sap (see TAR) is produced almost entirely in North Carolina. A cord of pine wood will produce 40 gallons. Wilmington, N. C., is the headquarters for the world's supply of tar and crude turpentine.

Statistics.— The city of Savannah, Ga., is the largest market in the world for naval stores. The output in the United States amounts to $10,000,000 annually. In 1900, the pine belt of the Southern States produced 340,000 casks or 17,000,000 gallons of spirits of turpentine, and 1,400,000 barrels of resin. The exports in a single year amount to over 250,000 casks. To produce these so-called naval stores 2,300,000 acres of pine forests are worked annually, and over 800,000 acres of virgin forest are invaded every year. The one great detriment to the industry is fire, and it has been estimated the annual loss from fire in the pineries will amount to $1,000,000. In South Carolina alone the turpentine industry employs over 7,000 workmen. There are 290 stills in the State, with a capital invested of $1,454,800, and an annual production valued at nearly $3,000,000.

Naval Tactics. See TACTICS, NAVAL.

Naval Veterans, National Association of, a patriotic society founded by delegates from the various associations of naval veterans throughout the Union at a meeting held in the city of New York, in January 1887. The object of the National Association is:

To cherish the memory and associations of the war of the late rebellion, to perpetuate the glorious names and deeds of our navy, to strengthen the ties of fraternal fellowship and sympathy, to advance the best interests of this association, and to extend all possible relief to the widows and orphans of members; to foster the cultivation of naval science; to encourage the building of an efficient navy and national defenses; to enforce unqualified allegiance to the general government; to protect the rights and liberties of American citizenship, and to maintain national honor, dignity, union, and independence.

Any officer, appointed or enlisted man who has served in the United States Navy, United States Marine Corps, or United States Revenue Marine Service during any portion of the time between 12 April 1861 and 25 Aug. 1865, who has not borne arms against the United States, or been convicted of any infamous crime, and who has been honorably discharged or resigned by an honorable acceptance of resignation, is eligible to membership in this association. There are 39 local associations under the national charter, a paid membership of over 7,500, and 3,000 contributing members.

Naval War College. See NAVY OF THE UNITED STATES.

Navarino, nä-vä-rē'nō, or **Pylos,** pī'lŏs, Greece, a seaport town on Navarino Bay, on the southwest coast of the Morea. Its official name is Pylos, ancient Pylos, the city of Nestor, now called Palæokastro and Palæo-Navarino, being at the north extremity of the bay. The Bay of Navarino was the scene of a great sea-fight between the Athenians under Cleon and the Spartans, 425 B.C. From 1492 to 1821, the town was in the possession of the Turks, when it was taken by the Greeks. The Turks recaptured it in 1825, and retained it until on 20 Oct. 1827 in Navarino Bay the Turkish and Egyptian navy of 89 ships was annihilated by 24 ships of the combined British, French, and Russian fleets under Sir Edward Codrington, the British admiral. Pop. (est.) 3,000.

Navarre, nạ-vär', Spain, a northern province, formerly, with a portion of the department of Basses-Pyrénées, France, constituting the ancient kingdom of Navarre. The province has an area of 4,046 square miles; the surface generally is mountainous and bleak, but in the valleys, and along the river banks, the soil is fertile, producing wheat, maize, barley, and oats. The principal rivers are the Aragon, Arga, Ebro, and Bidassoa. The mineral wealth comprises iron, copper, and rock salt. The chief towns are Pamplona, the capital, Tudela, Olite, and Estella. Pop. of province (1897) 302,978. Navarre was inhabited at an early period by the Vascones, who were expelled by the Romans. It was seized by the Visigoths in 470, invaded by the Saracens early in the 8th century, and fell under the sway of Charlemagne in 778. It became an independent state in 855. In 1035 Navarre was divided into three kingdoms — Navarre, Aragon, and Castile. The first two became united in 1076, and again separated in 1134. In 1285, it became an appanage of France, but recovered its independence in 1328. Ferdinand conquered it in 1512. The estates of Navarre took the oath of allegiance to him in 1513, and it was incorporated with Castile in 1515. After this act of spoliation, there remained nothing of the ancient kingdom of Navarre beyond a small territory on the north side of the Pyrenees, which was subsequently united to the crown of France by Henry IV. of Bourbon, king of Navarre, whose mother, Jeanne d'Albret, was granddaughter of Queen Catherine; and hence the history of Navarre ends with his accession to the French throne, in 1589, the French monarchs, however, until Charles X., being called also King of Navarre.

Navarrete, Juan Fernandez, hoo-ān' fĕr-nän'dĕth nä-vär-rā'tā, Spanish painter: b. Logroño about 1526; d. Toledo 1579. He was

known as 'El Mudo,' the mute, being deaf and dumb. He imitated the monk painter of the Milanese school, Fra Vicente; he then devoted himself almost entirely to the study of Titian, whose style and coloring he reproduced so successfully that he became known as the "Spanish Titian." Philip II. appointed him his court painter and much of this artist's best work was done in decorating the Escorial. Titian's influence is evident in a 'Birth of Christ'; a 'Holy Family'; and a 'Scourging of Christ' in the Escorial (1571–5), which have exercised a profound influence on the development of technique in Spanish painting.

Navarro, Madame. See ANDERSON, MARY ANTOINETTE.

Navarro, Pedro, pā'drō nä-vär'rō, Spanish general: b. Spain 1446; d. Naples, Italy, 1528. He was engaged with Gonsalvo de Cordova in the Naples campaign of 1500 and made such skilful use of mines as to influence largely the outcome of the war. For this service he was created Count of Alvetto and given command of a naval expedition against the Moors. He was taken prisoner by the French in 1512 and despairing of being ransomed he joined the French army. In an attack upon Naples he was again captured and died soon after.

Navas de Tolosa, Las, läs nä'väs dā tō-lō'sā, Spain, a village of Jaen province, 38 miles by rail north of Jaen, which owes its celebrity to the defeat near here of the Moorish army under Mohammed ibn Abdallah 16 July 1212, by the Spanish troops commanded by Alfonso VIII., assisted by an army of French and English crusaders. In the vicinity also, a battle was fought between the Spanish and French in 1812.

Navassa, nä-vä'sä, West Indies, a small island off the southwest coast of Haiti; about two miles long and one and one-half miles wide; altitude, 300 feet. High bold cliffs border nearly all the shore. In 1857, Peter Duncan, an American, discovered on this island a deposit of guano estimated to amount to 1,000,000 tons. According to an act of Congress, passed 18 Aug. 1856 relative to the discovery of guano deposits on unclaimed islands, it was decided that the island of Navassa should be considered "as appertaining to the United States." In 1889 trouble arose among the workmen on the island, and one man was killed in "the Navassa Riot." The murderer was tried by the courts under jurisdiction of the United States, and finally sentenced to be hanged. The question of jurisdiction was the only point in the case which caused delay; the sentence, in 1891, was commuted to imprisonment for life.

Nave, in Gothic architecture, that part of an ecclesiastical edifice to the west of the choir, and in which the congregation assemble; the part of a church between the aisles. See ARCHITECTURE.

Navesink (năv'ĕ-sĭnk) **Highlands,** a low range of hills, in Monmouth County, New Jersey, south of Sandy Hook, and at the mouth of Navesink River. Mount Mitchell, the highest point, is nearly 300 feet above sea-level. On an elevation, 195 feet, stands a lighthouse with two towers 100 feet apart and 53 feet in height. In each tower is a fixed white light. The Highlands are an important landmark to ships approaching "The Narrows," and the region in this part of New Jersey is a favorite resort for residents of New York.

Na'vew, or Naphew. See TURNIP.

Navic'ular Disease. See HORSE, DISEASES OF THE.

Navidad, La, lä nä-vē-däd', the name of a fort built by Columbus in 1493 on the coast of Haiti, and which was the first Spanish settlement in the New World. Here he left a company of between 30 and 40 men, but on his return in November of the same year found they had all been killed by the Indians and the fort destroyed. See COLUMBUS.

Navies of the World. The following summary gives the naval strength of the leading nations of the world as reported in 1901:

Argentine Republic.— Coast defense armorclad, 4; armored cruisers, 5; 2d-class cruisers, 3; smaller cruisers and gunboats, 7; torpedo destroyers, 4; torpedo boats, 1st-class 12, 2d-class 10.

Austria-Hungary.— Battleships, 2d-class, 6, 3d-class, 2; port-defense ships, 7; cruisers (armored), 2, 2d-class, 3, 3d-class, 8; gunboats, etc., 12; torpedo boats, 1st-class, 32; 2d-class, 31, 3d-class, 8.

Brazil.— Battleships, 4; coast defense vessels, 6; cruisers, 2d-class, 3, 3d-class, 2; torpedo boats, 1st-class, 8, 3d-class, 6; smaller cruisers and gunboats, 12.

British Empire.— Battleships, 1st-class, 20, 2d-class, 24, 3d-class, 11; armored cruisers, 2d-rate, 9; protected cruisers, 1st-class, 21, 2d-class, 45, 3d-class, 34; torpedo gunboats, etc., 33; torpedo destroyers, 80; torpedo boats, 1st-class, 11, 2d-class, 71; torpedo ships, 2. Vessels of small fighting value: Battleships, 4th-class and coast defense, 21; obsolete cruisers, 4th-class, 28; miscellaneous vessels, 89; torpedo boats, 3d-class, 95. Under construction and projected: Battleships, 16 armored cruisers, 1st-rate, 14; protected cruisers, 3d-class, 9; torpedo destroyers, 28; miscellaneous vessels, 6.

Chile.— Armorclad, 5; 2d-class cruisers, 2; 3d-class, 2; gun vessels and gunboats, 11; torpedo destroyers, 4; torpedo boats, 1st-class, 15, 2d-class, 4.

China.— Swift cruisers, 2; small cruisers, 3; torpedo destroyers, 3; torpedo gun vessel, 1; torpedo boat, 1; and several other vessels.

Colombia.— River gunboat, 1; other small vessels, 2.

Costa Rica.— Gunboat, 1; torpedo boat, 1.

Denmark.— Coast defense armorclads, 5; torpedo ship, 1; 3d-class cruisers and gun vessels, 6; gunboats, 7; torpedo boats, 1st-class, 14, 2d-class, 20.

Ecuador.— Torpedo launch, 1; transport, 1.

France.—Battleships, 6; armored cruisers, 5; torpedo destroyers, 28; torpedo boats, 112; submarine boats, 26. Under construction and projected (1902): Battleships, 22; armored cruisers, 19; destroyers, 24; torpedo boats, 151; submarine boats, 12.

German Empire.— Battleships, 2d-class, 8, 3d-class, 8; coast defense ships, 19; cruisers, 2d-class, 8, 3d-class, 5; torpedo gunboats, 8; torpedo boats, 1st-class, 35, 2d and 3d-class, 103. Under construction and projected: Battleships,

46; coast defense ships, 8; cruisers, 2d-class, 22; 3d-class, 48; torpedo boats, 114.

Greece.— Armored vessels, 5; torpedo boats, 17; unprotected vessels: corvettes, 2; cruisers, 2; gunboats, 12; revenue vessels, 3; also a steel yacht, an iron transport, and miscellaneous craft.

Haiti.— Cruisers, 3d-class, 6; sloops, 2; and a gun vessel.

Italy.— Battleships, 2d-class, 5; large armored cruisers, 3; small armored cruisers, 3; battleships. 3d-class, 9; protected cruisers, 1st-class, 2, 2d-class, 5, 3d-class, 8; torpedo gunboats, 15; torpedo destroyer, 1; torpedo boats, 1st-class, 11, 2d-class, 100, 3d-class, 71; submarine torpedo boats, 1. Under construction: Battleships, 1st-class, 3; small armored cruisers, 3; protected cruisers, 3d-class, 1; torpedo gunboats, 2; torpedo destroyers, 4; torpedo boats, 2d-class, 1.

Japan.— Battleships, 1st-class, 3; armored coast defense vessels, 5; armored cruisers, 7; protected cruisers, 13; smaller cruisers, 5; gun vessels, 10; torpedo boats, 1st-class, 29, 2d-class, 24, 3d-class, 4; destroyers, 12. Under construction or projected: Battleships, 1st-class, 3.

Mexico.—Despatch vessels, 2; unarmored gun vessels, 2; and a steel training cruiser. Under construction and projected (1902): Gunboats, 4; torpedo boats, 1st-class, 5.

Morocco.— An iron screw ship and a smaller vessel.

Netherlands.— Old ironclad turret ships, 2; unprotected cruisers, 6; old flat-bottomed gunboats, 30; and a number of coast defense monitors. Under construction and projected: Torpedo boats, 1st-class, 13, 2d-class, 15, 3d-class, 25; and 4 other 3d-class boats.

Norway.— Armorclad, 2; monitors, 4; unarmored gun vessels, 3; gunboats of various kinds, 28; torpedo boats, 27.

Panama.—Two small steamers.

Paraguay.— One small ocean steamer, and 2 small river steamers.

Persia.— One screw steamship and one river steamer.

Peru.— One cruiser, a screw steamer, and 10 small vessels.

Portugal.— Protected cruisers, 5; cruisers, 3d-class, 6; old armored vessel, 1; torpedo boats, 1st-class, 15, smaller grade, 30; gunboats of various kinds, 26. Under construction: Miscellaneous vessels, 8.

Rumania.— Protected cruisers, 1; gunboats, 7; coast guard vessels, 6; torpedo boats, 1st-class, 6, 2d-class, 2; training ship, 1; screw despatch vessel, 1; projected: Armored vessels, 2.

Russia.— Battleships, 1st-class, 3, 2d-class, 10, 3d-class, 1; coast defense vessels, 12; armored cruisers, 10, 2d-class, 3, 3d-class, 1; gunboats and miscellaneous, 30. Under construction and projected (1902): Battleships, 1st-class, 5, 2d-class, 9; coast defense vessels, 1; armored cruisers, 2, 2d-class, 3, 3d-class, 4; gunboats and miscellaneous vessels, 10.

Santo Domingo.— Small gunboats, 3.

Servia.— Steamer used in the military service, 1.

Siam.— Cruisers, 2; gunboats, 4; training ship, 1; torpedo store ship, 1; transports, 3; despatch boats, 4; yachts, 5.

Spain.— Battleships. 1st-class, 1; coast defense ships, 2; armored cruisers, 1st-class, 3; protected cruisers, 1st-class, 1; cruisers, 2d-class, 5, 3d-class, 4; gunboats, etc., 60; torpedo boats, 1st-class, 20, 2d-class, 3, 3d-class, 4. Under construction: Cruisers 2d-class, 2, 3d-class, 1; gunboats, 1; torpedo boats, 4.

Sweden.— Armored coast defense turret ships, 1st-class, 10, 2d-class, 4, 3d-class, 9; steam corvettes, 3; torpedo cruisers, 5; gunboats and despatch vessels, 13; torpedo boats, 26; miscellaneous, 13.

Turkey.— Coast defense ships, 12; cruisers, 2d-class, 2, 3d-class, 4; gunboats, etc., 6; torpedo boats, 1st-class, 19, 3d-class, 7.

United States.— Battleships, 1st-class, 9, 2d-class, 1; coast defense ships, 19; armored ram, 1; armored cruisers, 2; protected cruisers, 15; unprotected cruisers, 3; dynamite vessel, 1; gunboats, 17; torpedo boats, 24. Under construction: Battleships, 1st-class, 10; armored cruisers, 6; protected cruisers, 9; gunboat, 1; monitors, 4; torpedo boat destroyers, 18; torpedo boats, 15; submarine torpedo boats, 7.

Venezuela.— Steamers, 3; sailing vessels, 2; and a number of small gunboats.

See also NAVAL ARCHITECTURE; NAVY, HISTORY OF; NAVY OF THE UNITED STATES, THE; NAVAL SERVICE, THE.

Navigable Rivers. See RIVER.

Navigation, The Science of Modern. At sea, with no land in sight, there are two methods available to the navigator for finding where his vessel is, — by "dead reckoning," and by "observation" of the heavenly bodies.

Dead reckoning consists in applying to the last accurately determined position of the vessel the "run" that has since been made good, and regarding the position thus obtained as the most probable one at the instant under consideration. The positions regarded as accurately determined and upon which future dead reckoning is based are such as are obtained from terrestrial objects before losing the land, or by astronomical observations; each time there is a new determination of position it affords a new basis, or "departure," for the dead reckoning. If a vessel known to be in lat. 45° 0′ N., and lon. 25° 0′ W., steers thence to the northward and eastward until, according to the best methods of reckoning course and distance, she has arrived at a point 45 minutes farther north and 30 minutes farther east, the position by dead reckoning is 45° 45′ N., 24° 30′ W. Tables computed ready to hand for the navigator's use give, at a glance, the distance to north or south and to east or west corresponding to each distance on each course; for instance, if the vessel runs 30 miles to the east-northeast, the equivalent is shown to be 11.5 miles north and 27.7 miles east.

The unit of distance used at sea is the nautical mile, or "knot," of 6,080 feet, which is about 1 1-7 land or statute miles; this is practically equal to one minute of latitude over all the earth, hence its adoption affords great facility in computations; the exact length of a minute of latitude of course varies by a few feet, at different distances from the equator. on account of the earth's flattening at the poles, but this mean value answers closely enough for navigating purposes. and when the ship makes a knot or "northing" or "southing" the navigator may consider that he has made a minute of latitude wherever he may be, and for 60 of

them, a degree. Not so, however, with longitude, for the distance between meridians, and subsequently the length of a degree or a minute of longitude, grows less as we approach the poles; at the equator the minute of longitude and minute of latitude are equal; but as one travels north or south from the equator conditions change; if a man were standing upon the North Pole he might, by a whirl upon the heel, make the circuit of all the earth's longitudes, while it would take a journey of about 25,000 miles to accomplish the same thing at the equator; for intermediate latitudes, there is an intermediate relation of the minute of longitude to the knot, a knot being, for example, 1.1 minutes of longitude at the 30th parallel and two minutes at the 60th. All of these different values are tabulated in navigation books, in convenient form, so that this unaccommodating feature of the longitude is not such a bugbear to the seafarer after all.

The dead reckoning obviously depends for its accuracy upon the correctness with which the mariner knows, first, the course, or direction in which the vessel has moved, and, secondly, the distance run; and it is the course and distance "over the ground" that should be considered, for a knowledge of the ship's progress through the water will not suffice for exact results if the water itself has been in motion. From this it may be understood that errors are always to be expected in dead reckoning, due to inaccuracies in estimating the course and the distance sailed, and to the effect of the unknown movement of the sea itself, that is, the "current."

To obtain the course, or direction, sailed, the compass is the sole source of knowledge. It may be considered that this is quite sufficient, and so it is when thoroughly understood; but the compass is not the simple and obedient servant of the mariner that it is ordinarily credited with being. "True as the needle to the pole" may be outrageously false, and usually is. The pole that the free magnetic needle seeks is the earth's magnetic pole, situated in Arctic North America, not the geographical one to which we are accustomed to refer; hence the needle points at an angle from the true north which depends upon the relative directions of the two poles at the position of the observer. This inaccuracy amounts to about 9 degrees at New York, about 15 degrees at London, and attains a value of upward of 30 degrees on a voyage between the two places; at some points in the region of the magnetic pole the error is very large, and, as may readily be conceived, in localities between the magnetic and geographical poles the "north" end of the needle points due south. The error caused by this discrepancy in the indication of the needle is called the "variation," or "declination," of the compass; its value has been determined, by observations, for all the navigable waters of the globe, and the results are accessible to the mariner, who makes allowance for the false pointing of his compass according to the position in which he finds himself; he must be careful, however, to employ the value corresponding not only to the proper place but also to the proper time; for the magnetic pole has a slow motion which is constantly creating differences in the values of the variation, so that in the course of a few years a material alteration takes place in this error in each locality.

This false pointing due to variation is only one of the untruths of the needle; there is another and a more obscure one that the navigator must guard against. In every vessel in which iron or steel is used to any material extent for construction or equipment, or in which these metals are carried in the cargo, there is exerted upon the compass needle a magnetic effect independent of that of the earth, and the needle, instead of seeking the magnetic pole, takes up a position that is dependent upon the combined influence of the magnetic force of the earth and that of the ship. This error is called the "deviation" of the compass, and it exerts a different influence and therefore produces a different deflection of the needle, on every different heading of the ship, in every different locality, and on every different angle of inclination from the vertical, or "heel," of the ship; in other words, it is different at Yokohama from what it is at Singapore — different when the ship heads northeast from what it is when she heads southeast, different when she heels to starboard on one slope of a wave from what it is when she heels to port on the other slope. It is not at all unusual for the deviation to amount to as much as 45 degrees, and it may reach a very much higher value. To overcome this error due to the ship's own attraction of the needle, it is customary to "compensate" the compass,— that is, to place near the needle artificial deflectors which will oppose to each of the various magnetic forces of the ship an equal corrective force, and thus neutralize the disturbance under all the various circumstances that may arise. Such of the ship's metal as has actually attained the properties of a magnet is corrected by small bar magnets; to such as exerts a magnetic effect through "induction" only (that is, the temporary influence of the earth's magnetism), non-magnetic masses of iron are opposed which are capable of acquiring an equal amount of temporary magnetism under identical conditions with that of the ship; and so for each of the disturbing elements. By the compensation of a compass it is possible to reduce the deviation to a very small amount, and such residual as there may be is then determined and allowed for.

But even with the compass thoroughly understood there are other errors that may occur in the reckoning of the course; the helmsman may be inexpert or the sea heavy, and in consequence the ship may not always head as desired; she may go off sidewise, or, to use the nautical expression, "make leeway," to an unknown degree; and an ocean current for which it is impossible to make accurate allowance may produce errors of both course and distance.

The distance run is the second essential element of the dead reckoning. It is ascertained by various methods. In the early days of navigation it used to be determined by tossing a piece of wood overboard from the forward part of the vessel and then having a man walk aft, keeping abreast of it as it was left behind by the vessel; the time it took the man to traverse a known distance on the deck afforded a basis for calculating the speed.

This method was replaced by one still in use on many vessels — "heaving the log." A "chip," or piece of wood of appropriate shape

is tossed overboard astern, being arranged to float in an upright position and thus present a flat surface not easily drawn through the water; to it is attached a marked line; the chip remains stationary while the line is paid out from a reel; the distance that the chip is left astern in a given time (usually indicated by a sand-glass) shows the speed of the vessel, the marks of the line being so placed as to give the result directly in knots.

The most modern method of determining speed is by the "patent log"; a small screw-shaped "rotator" is kept towing astern at the end of a long plaited line; as the vessel moves through the water the little screw rotates, the principle involved being the same as that upon which the big screw-propeller drives the ship; each turn of the rotator is transmitted through the tow-line to the shaft of a registering apparatus, and the distance run at any moment may be read from the register as one tells time by the clock. Some navigators dispense with all instruments and reckon distance by the revolutions of the engine — a successful method if they have a sufficiently extensive acquaintance with their vessels to know the number of revolutions required to drive the vessel a distance of one knot through the water under all the different conditions that may be encountered.

Absolute accuracy of results in the recording of distance is seldom attainable, notwithstanding the superior means of determination that exist in these later days; so that the distance, like the kindred term of the problem, the course, can never be relied upon implicitly, and the navigator must look for a means to obtain, from time to time, a fresh "departure" by which he may start anew his dead reckoning. For this purpose observations of the celestial bodies are made.

For the taking and working of astronomical sights there are required a sextant, a chronometer and a nautical almanac. The sextant is a light, handy instrument by means of which the angle between two objects may be measured. It carries two mirrors, of which one is capable of motion about a pivot, and the other is fixed. There is a telescope through which the observer looks directly toward one of the objects — in the case of a sea observation, the horizon; the movable mirror is then placed in such a position that a ray of light from the second object (the sun, or other heavenly body) is reflected to the fixed mirror and thence, through the telescope, to the eye of the observer. When the one object, seen directly, and the other, seen by reflection, appear to the observer to be in coincidence, the measure is made, and it only remains to read the amount of the angle from a graduated scale over which an index travels to mark the position of the movable mirror on its pivot; and so nice is the graduation and so effective the method of reading that angles may be measured to the nearest ten seconds, or to $\frac{1}{360}$ part of a degree. This accurate instrument is the descendant of a primitive one, used by early navigators, in which the measure was made by a plumb-bob — a very rough guide, especially on board a vessel tossing with the sea.

An instrument of equal importance in navigation is the chronometer, which is nothing more nor less than a time-piece in which every known device is employed to insure absolute uniformity of running. It is hung in "gimbals," or swinging rings, so that it may remain level as the ship rolls and pitches; and it is kept in a damp-proof, dust-proof and shock-proof case, and treated with the utmost tenderness, being especially guarded from changes of temperature. It is not expected that the chronometer shall always show absolutely the correct time of the standard meridian, but the requirement demanded is that its gain or loss shall be precisely the same from day to day; the latter condition being fulfilled, the navigator may ascertain, before leaving port, the "error" of his instrument, or the amount it varies from the true time at a certain place on a certain day, and the "rate," or amount of change in each 24 hours; and with this information it is a simple matter to determine the error in the indication on any future day, providing the actual rate agrees with the predicted one. Good chronometers, properly cared for, run with wonderful uniformity, and few gain or lose as much as three seconds a day. The evenness of their going is such that navigators may count upon the longitude based upon their indications being correct within a couple of minutes, even after a long voyage; and when it is considered that four seconds of error in the chronometer makes an error of a minute in the longitude, the accuracy with which the performance must agree with the prediction may be realized. In view of the importance of the chronometer in the determination of position, the better equipped vessels carry three or more of these instruments, instead of putting unlimited faith in a single one; for in every piece of mechanism there is a chance, however remote, of misbehavior somewhere, and with several instruments available for comparison any departure from a normal rate on the part of one is quickly revealed by the others. It is probable that a further safeguard will soon be afforded, for when the wireless telegraph comes into general use a signal may be sent out each day at Greenwich noon or some other definite instant of time, thus enabling the error of the chronometer to be determined daily at sea with as complete accuracy as it may now be determined ashore.

The finding of the ship's position by astronomical methods is not possible without a knowledge of the time, this element having a direct bearing upon the longitude. Hence no great degree of accuracy in navigation was attainable until the invention of a time-keeper that could be counted upon for an even performance under the conditions existing on shipboard. In 1714, the Parliament of Queen Anne offered a reward for the production of such an instrument, the amount to vary with the degree of success achieved. John Harrison, an Englishman who had devoted his life to the perfection of the chronometer, finally offered an instrument which, in 1758, was placed for trial aboard a naval vessel making a voyage to Jamaica and return; on arrival home, after an absence of five months, the error of its indication was found to amount to only 1 minute 5 seconds, or about 16 minutes of longitude, and the inventor was awarded the highest prize that had been offered, $100,000.

There is published annually, by the government of each of the more important maritime nations, a "Nautical Almanac," in which are given tables by which the positions of the sun,

moon, planets and all fixed stars of material magnitude may be found for any instant throughout the year. The navigator who is supplied with this book, together with a sextant by which he may measure the angular height, or "altitude," of any visible body above his horizon, and a chronometer rated to the exact time of a standard meridian (such as that of Greenwich), has at hand all the means necessary for finding the vessel's position by means of the celestial bodies.

Suppose that a bird is flying through the air on a known course and in such manner that its position above the earth may be determined for any given instant of time; and suppose that at a certain moment an observer with a sextant and watch measures the altitude of the bird — that is, its angular height above the horizon — and simultaneously records the time. Now take as a centre the point on the earth vertically below the bird, this point being known from the position as given by the time; and from that centre draw a series of circles. If we consider any one of those circles it may be seen that from every point of its circumference the bird will appear at the same angular distance above the horizon at the given instant; further, there will be one circle whose circumference contains our observer, and from every point of that circumference the altitude of the bird will be that which he measured. It is therefore clear that the observation has resulted in locating the observer upon one of a series of points which lie upon a certain circumference; but it has not defined the particular point. If, however, there is another bird flying in a known track, or if the observer waits while the first bird changes position somewhat, he may observe a second altitude and draw another circle that also takes in his position; then he will know that he is at one of the two points where those circles intersect, for if he is at the same time on both circles these are the only places at which the condition is fulfilled.

At sea, the sun, moon and stars take the places of the birds with which we have just been dealing, and our spheroidal-shaped globe that of the plane surface upon which we considered the observer to be standing. The altitude of a celestial body is measured with the sextant and the time is simultaneously noted by the chronometer; the chronometer correction being applied, the navigator knows the exact instant at which the observation was taken, which, from the information given in the Nautical Almanac, defines the position of the observed body with relation to the earth, taking account both of the daily rotation of the earth about its axis and of its annual revolution about the sun; and, having located the body, a circumference may be determined which will, like that in the case of the bird, take in all positions at which the observed altitude is possible; so also may a second circumference be determined either by a second celestial body or by the same body at a later time, and the intersection of the two circles will give the position of the ship, due allowance being of course made in case there has been a change of position between the two sights.

Practically, it is never necessary to deduce the whole circle, for the circumference may be very large, taking in perhaps half the globe; the navigator need only work out an arc a few miles in length, for the vessel's position is always known within narrow limits from the dead reckoning; for a similar reason, there is never any question in the navigator's mind as to which of the two intersections represents the true position. The computation is not a difficult one, being facilitated, like many other operations in navigation, by tables. When the body observed is on the meridian the problem assumes a particularly simple form, and hence it is an invariable rule, if the weather is clear, to take an observation of the sun when it attains its maximum altitude at noon, and to work up the day's run to that time and begin anew the dead reckoning. Any heavenly body may be used for obtaining position, providing it shows with sufficient clearness to be observed through the sextant, and providing also that the horizon is in sight. Sights of the sun are more generally used than those of other heavenly bodies; indeed, there are some navigators that seldom employ others; such sights have some advantage in simplicity of working, and may usually be taken with a more distinct horizon and consequently greater accuracy; but in the fast-moving modern steamers it is almost imperative to find the position more frequently than is possible by using the sun alone, and so the stars and planets (and occasionally the moon) are called into service.

When clouds and fog prevent the taking of observations, the mariner has no recourse but to rely upon the dead reckoning; but his reliance, in such a case, is not implicit, and the cautious captain — and how few are not cautious, with their heavy responsibility for life and property? — makes due allowance, in approaching the land, for possible inaccuracies in the supposed position.

Thus far, the methods of the navigator in the open ocean have alone been considered; but there is another branch of his art that remains to be touched upon — "piloting," where the land is in sight, and where courses are shaped and positions found from terrestrial objects. The first requisite for this work is a nautical chart, which shows the features of the land and water with a completeness of detail that the landsman would scarcely dream of. Upon it are represented, in proper position, the shore-line and the prominent characteristics of the land,— mountains, towns, lighthouses, windmills, conspicuous trees and houses, sand beaches, bluffs, rocks, islets — everything that could possibly be recognized by a person on a passing vessel and utilized for locating position. The water is also depicted, and nearly all that is above and below it — buoys, light-ships, and all floating objects of a permanent nature; the depth of water at frequent intervals, especially over shoals, reefs, and dangers; the character of the bottom in different regions, whether mud, sand, coral, or other substance; the direction and velocity of tidal and other currents that may be expected; and much useful information besides. By this chart, the ship may be guided in safety among the dangers that beset her near the land. When any object is in view which is portrayed upon the chart, the navigator may observe, by sighting over the compass, the "bearing," or direction, in which it lies; if a line is drawn upon the chart through this object in the observed

direction by the aid of the compass circles placed here and there, it is known that the ship's position on the chart is somewhere upon that line; then, if a second line is similarly drawn through another visible object, the exact location of the ship must be at the intersection of the two. Various other methods of a like nature afford the means for plotting the position of the vessel.

If, as in foggy weather or on an unlighted coast, there is nothing in sight by which the ship may be located, soundings may be taken, and the depth of water and character of bottom compared with those shown on the chart, thus giving a fair approximation to the position. In certain places, the nature of the bottom is more favorable for navigation by soundings than in others; thus the formation of the ocean bed to seaward of New York is such that in thick weather vessels may, with care, run well in toward the entrance of the harbor with no guide but the depth. Soundings may be made by direct measurement with a marked line lowered to the bottom by a heavy "lead" which serves as a sinker, but the method involves stopping the vessel to get an "up and down cast" when the depth is considerable; this disadvantage is obviated by the employment of a patent sounding-machine, the most useful of all modern inventions for the aid of the navigator, in which the depth is determined from the pressure exerted by the weight of water above the lead; this device registers as accurately when trailing astern as when suspended vertically, so that soundings may be taken with the vessel going at regular speed.

In piloting, the navigator receives assistance from all sorts of artificial marks that are maintained for the purpose by the various governments, and the ingenuity displayed in some of these is characteristic of the age in which we live. There are all sorts of buoys — spar buoys and can buoys; buoys that ring bells as they roll with the sea, and those that blow whistles by the air compressed as they rise and fall upon the waves; buoys that are lighted by electricity and those that are lighted by gas, the latter burning night and day, without renewal, for months, and sometimes automatically eclipsing their lights at definite intervals to make them distinctive. Then there are all sorts of lighthouses showing all sorts of lights — fixed, revolving, flashing, intermittent, white, red, green; and some possess one characteristic in directions whence the approach is clear, and another characteristic on bearings where they shine over dangers. There are also the lightships to give warning of dangers at a distance from the shore, like that on the Diamond Shoals, 14 miles from the dreaded Hatteras, maintained in one of the most boisterous spots of the ocean, which, besides showing other lights, throws a search-light beam vertically toward the heavens to mark the mariner's way. Moreover, since lights are of small avail in foggy weather, nearly every lighthouse and lightship has its fog signal — a siren, a steam trumpet, a bell, or sometimes a gun; and each of these is sounded according to some precise characteristic by which it may be recognized and distinguished.

GEORGE WOOD LOGAN,
Lieutenant, United States Navy.

Navigation Act, an important act passed by the British parliament in 1651 for the protection of British shipping and commerce. In relation to early American conditions the act provided that all colonial trade should be carried on in ships built and owned in England in the colonies (a provision which stimulated colonial shipbuilding), and that, in the case of many specified goods, trade should be with England only. The act was largely rendered inoperative by colonial smuggling. The efforts at last made to enforce the rule were among the chief causes of the Revolution.

Navigation Laws, as adopted by the United States in 1792–3, have been in operation since that date with few changes or revisions. The laws contain the following provisions: No vessel, unless entirely built in this country and wholly owned and officered by Americans, is considered an American vessel having the right to be protected by the American flag. No foreign vessel is permitted to engage in the American coasting trade, the same extending from Atlantic to Pacific ports. American vessels are no longer considered as such if even a part-owner (with a few exceptions) resides abroad for a short time. Transfer of an American vessel to foreigners prohibits it from ever again sailing under the American flag. If an American vessel makes any repairs in a foreign port, duty must be paid on the value of all such repairs on her return to this country. The repairing of foreign vessels in our ports, with foreign materials, is placed under restriction. A tax of six cents per ton of their burden, called a tonnage tax, is imposed on all vessels (except fishing and pleasure vessels) engaged in trade to ports not in North or Central America and a few other specified places, the maximum aggregate tax in any one year not exceeding 30 cents. Foreign vessels pay the same tax, but if one of the officers of an American vessel is a foreigner, it is forced to pay an additional tax of 50 cents. Materials for the construction of vessels for foreign trade may be imported free of duty, but the duty must be paid if the vessel engages for more than two months a year in the coasting trade. American vessels may unload at any port of delivery in the customs district, but foreign vessels can only discharge their cargoes at a port of entry, which is a certain designated port in each customs district in the United States. Exceptions are made when they are laden with coal, salt, or similar merchandise in bulk. See ADMIRALTY LAWS; LAW, MARITIME.

Nav'igators' Island. See SAMOAN ISLANDS.

Naville, Edouard Henri, ĕd-oo-ār ŏn-rē nā-vēl, Swiss Egyptologist: b. Geneva 14 June 1844. He was educated at the University of Geneva, at King's College, London, at Bonn, and at Paris; went to Egypt in 1869, and there made important discoveries; was appointed editor of the 'Book of the Dead' by the London Congress of Orientalists in 1875, and in 1886 published 'Das Aegyptische Todtenbuch der 18. bis 20. Dynastie'; and in 1891 became professor of Egyptology at Geneva. He contributed volumes on the store city of Pithom (1885), on Goshen (1887), on Osorkou II.'s festival hall (1892), etc., to the 'Memoirs' of the Egypt Exploration Fund.

Navy, History of the. From a period earlier than authentic history, the Greeks began to exhibit a spirit of naval enterprise, and as long as their independence remained the various states into which both the mainland and the islands of Greece, as well as their Asiatic colonies were divided, rivaled each other in planting colonies and pushing their commerce in all directions. These states had also their armaments, and fought fiercely with one another, as well as with their foreign foes. The Athenians, Corinthians, Rhodians, even single cities like Chalcis and Megara, became renowned for their naval strength, and naval battles play a conspicuous part in the history of Greece. In the Persian invasions of Greece the size and power of the Persian fleets also forms a notable circumstance, and the great battle of Salamis (480 B.C.), in which Themistocles defeated the fleet of Xerxes, was the turning-point of the last Persian invasion. The smallness of the Greek galleys, and the superior size and number of those of the enemy, render this battle remarkable. The details of the tactics employed in it, and even the position of the rival fleets, are still matters of critical disputation.

But centuries before the rise of any naval power in Greece, Phœnicia (q.v.) had, certainly as early as 1100 B.C., a powerful fleet to protect its commerce and colonies through the Mediterranean from the attacks of pirates.

Among the Phœnician colonies arose one which in enterprise, ambition, and power eclipsed the parent state. Carthage, the rival of Rome, rose to her high rank among the nations of antiquity purely in virtue of her naval commerce. In her long struggle with Rome it was mainly the wealth acquired by commerce which enabled her to maintain the conflict. The Carthaginians also stimulated the Romans to enter upon naval enterprise. A Carthaginian vessel which had been cast on the coast of Italy furnished the model for their first fleet, which consisted of 100 quinqueremes and 20 triremes. This fleet is said to have been built in 60 days. Duilius, who commanded it, wisely distrusting the seamanship of his improvised sailors, contrived a means of approximating his first contest with the Carthaginians as nearly as possible to a land fight. By the use of grappling irons peculiarly contrived the Roman vessels were firmly attached to those of the enemy, and a struggle ensued, in which superior force and determination alone could influence the result. Thus the first great naval battle of Rome, fought off the Lipari Islands, 260 B.C., by the fleet of Duilius against a Carthaginian fleet of superior size under a leader named Hannibal, resulted in a complete victory, which was celebrated by a triumph at Rome.

The Ancient Galley, the war-ship of the Greeks, was a narrow vessel about 100 feet in length. It was admirably fitted to move rapidly in smooth water, and the numerous rowers gave great impetus to the attack of the beak, which was its principal means of aggression. The bow curved inward, forming a circular beak, which was faced with iron; or else it receded suddenly, having a single sharp point like a ploughshare, projecting at the surface of the water, and intended to open the side of an antagonist. Frequently the beak was formed to represent a lion, tiger, or other ravenous beast calculated to inspire terror. It was always surmounted by the national emblem; thus an owl stood on the prow of an Athenian galley; a cock on a Phœnician or Carthaginian; and the eagle on a Roman. Here or at the stern were also placed the ensigns and standards, and trumpeters standing beside them sounding their shrill blasts to inspire courage at the moment of onset. From the bow to the stern there extended a flooring or deck, which served as a battle-field for the mailed and heavy-armed soldiers. The stern was covered with a circular shed or pavilion, richly carved and decorated with streamers and trophies. Under this was placed the *tutela,* representing some patron deity, to which sacrifices and prayers were offered, and which was held so sacred as to furnish a sanctuary to whoever took refuge there. From this elevated station, too, the commander surveyed the fight and directed the efforts of his followers. There were two distinct classes of officers and men in each galley. The commander of the soldiers was supreme, and under him the pilot, who took his station abaft, at the side of the steersman, directed all necessary evolutions and maneuvers. The pilot was assisted in the command of the sailors by his mate, and by the boatswain or encourager of the rowers; whilst a musician marked the measure of the stroke, and by the harmony of his voice and instrument inspirited the rowers when weary with toil. The rowers were frequently, as in modern times, malefactors chained to the oar. Javelins and arrows were discharged in showers from the deck, or from turrets at the bow and stern. As a protection from these a curtain of hides was used, from behind which the soldiers discharged their missiles in return, and thrust with long spears used only at sea. In the centre were engines from which rocks were projected of size sufficient to sink a ship; and masses of iron called dolphins were projected from the mast-heads to break the bottom of the enemy's vessel. But the chief means of offense was the attack of the beak, and to make it with advantage it was generally desired to gain the wind. Combustibles were also cast from ship to ship, and peculiar devices due to the ingenuity of the particular commanders adopted on special occasions. The line of battle was usually triangular, the admiral's ship being at the angle in advance, and the line of storeships forming the base. Before encountering it was usual for the admiral to pass in a small boat throughout his fleet, haranguing his followers, and urging them to do their duty. Thus inspirited a shout of anticipated triumph would pass from ship to ship, and when the gilded shield was at length displayed as a signal for battle, the shrill trumpets sent forth their blasts, and the combatants rushed to the encounter, rending the air with shouts and war songs. The battle won, the victors returned to port, towing their prizes, their ships being decorated with fragments of the wrecks, themselves crowned with laurel, and singing pæans to Apollo. The richest of the spoils was reserved as an oblation to the gods, and broken or sometimes entire galleys were placed in the precincts of the temples. Little change was made by the Romans in their mode of warfare down to the time of the fall of the empire. The emperors of Constantinpole had still a fleet of galleys propelled by rowers.

Navies of the Middle Ages.—On the fall of the Roman empire naval enterprise declined, but only for a brief period. The honor of reviving it is disputed by the French and the Italians. To the latter chiefly belongs the honor of leading the way in the development of modern European commerce, but for the growth of naval armaments we must look also to the north of Europe. Charlemagne had a considerable fleet both on the Mediterranean and the ocean; but already in his time, and even in that of his predecessors, the settled states of Europe had begun to become subject to the piratical excursions of Northmen and Danes, which were afterward directed so persistently against England, and continued for several centuries to disturb its government. In the meantime the Italian republics of Venice and Genoa began to restore the commerce of the Mediterranean, and to open up communications with India by the Red Sea and the Persian Gulf. The Pisans and Florentines followed, and in the time of the crusades the chief naval armaments of the Christians were supplied by the Italian cities. The successors of Charlemagne did not follow his example in maintaining a regular fleet, yet Saint Louis was able to transport his own army to Africa, and to defend his coast against the English, but Philip le Bel had recourse to the Genoese against the English. The great naval battles of these times were fought among the Italian republics, or by them against the Turks, with whom they alternately traded and made war. After the epoch of the crusades we have a period which in one aspect of its development might be called the epoch of commerce and especially of mercantile navigation. The honor of leading the way in this new epoch belongs to the Portuguese. They were followed by the Spanish, the English, the Dutch, the French, and ultimately by all the other nations of Europe, according to their means and opportunities. The Spanish navy reached its highest power in the time of Charles V. and Philip II. Francis I. attempted the revival of the French marine and it was vigorously undertaken by Richelieu. The administration of Colbert revived both the mercantile and national navy, and the latter attained its chief strength and highest glory in the reign of Louis XIV., when it opposed, and sometimes not unsuccessfully, the united navies of England and Holland. The navy of Holland became powerful almost from the time of the national independence, and contended with success alternately against the fleets of England and France. Some of the most hotly contested naval battles on record have been fought between the English and Dutch fleets.

Cannon are said to have been first used in naval warfare by the Venetians against the Genoese in 1370, a considerable time after their invention.

The Battle of Lepanto.—The famous battle of Lepanto, which was fought between the Christian powers and the Turks 7 Oct. 1571, may be considered as representative of the first stage of the transition from the earlier mode of warfare. The Christian fleet was collected in the port of Messina in September 1571. It was contributed by the powers who had joined in the Holy League. The Spanish fleet consisted of 77 Spanish, 6 Maltese, and 3 Savoyard galleys under Don John of Austria, who commanded the joint fleet; there were 12 papal galleys, under Marc Antonio Colonna; and 108 Venetian galleys, and 6 galeazzi under Sebastian Veniero. The Turkish fleet, consisting of 300 vessels, under Capudan-pasha, Musinsade Ali, lay in the Gulf of Lepanto. Though the Turks were more numerous, the Christians were better armed and equipped. Their soldiers wore coats of mail and helmets, and were provided with firearms. The Turks defended themselves with leathern shields, and had bows and arrows in place of guns. The prows of the Christian galleys were less open and better defended than those of the Turks. The admirals, according to ancient custom, led the van. Both parties moved to the assault, but the wind changing at the moment favored the Christians. The admirals' galleys closed after a brief cannonade, and grappled each other. The Spaniards boarded three times, and were thrice driven back. A reinforcement of 200 men enabled them to return again to the assault with decisive effect, and an indiscriminate slaughter of the Turks took place. The head of Ali was exhibited on a pole to his followers. The battle after this only waxed fiercer, and the Turks fought with the courage of despair. So intense did the struggle become that the galley slaves in both fleets joined in the contest; but while the galley slaves of the Christians, who consisted of criminals, fought on their own side in hope of earning a pardon, those of the Turks, who were Christian slaves, rose against their masters. Over 15,000 Christians are said to have been relieved from servitude by the victory. The Turks lost besides 224 ships and 30,000 men.

Modern Navies.—The improvements determined by the use of artillery were chiefly an increase in the size and offensive strength of the ships, and a relative diminution in the number of men. Oars were abandoned for sails. Battles were fought and ships maneuvered by the sailors, and the marines or organized body of soldiers became a mere auxiliary force, available as sharpshooters and for land engagements. Two leading qualities now stood forth as the most important object to be attained in the construction and equipment of vessels for war—strength of offensive armament and speed and facility of maneuvering. These qualities did not now first acquire importance, but they gained in relative importance at the expense of a previously preponderating element of equipment, namely, the number of fighting men available for assault at close quarters. Two classes of vessels, according to the preponderance of one or other of these qualities, thus came to constitute the chief strength of modern fleets. The ship of the line, or first-class war-vessel, carried the strength of offensive equipment to the utmost limit practicable without sacrificing seagoing qualities. The frigate, only excelled in strength by a line-of-battle ship, was built and rigged with every artistic appliance to secure speed. Even line-of-battle ships were sometimes made too heavy for effective service, and facility of movement could not be altogether neglected with impunity; but the great point in a first-class vessel was the weight of broadside, and a hundred or more guns on three decks were commonly carried. In a pitched battle it was the line-of-battle ships that bore the brunt of the fight and decided the day. The frigates scoured

the seas on special missions, escaped from the enemy's line-of-battle ships by speed, destroyed his privateers, and protected the commerce of their own state. During all the great European wars these were the leading types of vessels employed. The tactics of naval warfare during this period, allowance being made for the different means of offense, did not differ materially from the ancient methods. To gain the wind of an adversary, to break his line and to engage him at close quarters with superior force, were still the main objects to be pursued. But a change took place when steam was introduced as a means of propulsion, and iron as a material for the construction of vessels. Vessels clad in iron armor now came to supersede the oak-built ship of the former epoch. More recently improvements made in the size, range, and destructive power of projectiles have effected a new revolution, or succession of revolutions, in the science of naval armaments, and the broadside has given way to a small number of powerful guns. The struggle between these new developments of offensive and defensive force still goes on. Iron clad and steel clad ships have superseded the wooden walls, and the introduction of gunboats, torpedo boats, submarines, torpedo destroyers and other craft have made naval warfare a new and peculiar science, totally different from the naval warfare of the past.

See NAVAL ARCHITECTURE; NAVAL SERVICE, THE; NAVIES OF THE WORLD; NAVY OF THE UNITED STATES, THE.

Consult: Clowes, 'Royal Navy'; Garbett, 'Naval Gunnery'; James, 'Naval History of Great Britain'; Longridge, 'Naval Guns'; Mets, 'Naval Heroes of Holland'; Rawson, 'Famous Naval Battles.'

Navy League of the United States, The, an organization formed in 1902 for the purpose of upbuilding the American navy. In 1903 the association began the publication of a monthly bulletin, 'The Navy League Journal.' The League has a large and growing membership and promises to exceed that of similar organizations in Europe. The German Navy League has now, at the end of its fifth year, 626,201 members. The British Navy League, with sections in all the British provinces, has nearly as many members, and is becoming a great power in Great Britain. The French Navy League, with a former president of the republic as its president, has the support of the most influential people of France.

Navy Maneuvers. See ARMY AND NAVY MANEUVERS.

Navy Register, a Government publication issued annually by the United States Navy Department. It gives a complete list of the officers of the navy and the marine corps in order of their rank, lists of retired officers, resignations, dismissals, deaths, ships in service and other important naval information.

Navy Yard, a water-frontage usually including wharves and dry docks used by the government for building and repairing warships, keeping naval stores, etc. In Great Britain the term dockyard is generally used. On the continent the word arsenal is frequently employed. In England the royal dockyards are at Chatham, Sheerness, Portsmouth, Devonport, and Pembroke, besides the Deptford and the Woolwich store yards. There are also royal dockyards at Haulbowline in Cork Harbor, at the Cape of Good Hope, Gibraltar, Malta, Halifax, Bermuda, Antiqua, Jamaica, Sierra Leone, Trincomalee, Singapore, Hong Kong, Esquimalt (Vancouver's Island), Fernando Po, Sidney, and Shanghai. The greatest naval centres of France are Cherbourg, Brest, Lorient, Rochefort, Toulon, and Bizerta in Tunis. Germany has three ports of war, Kiel, Dantzic, and Wilhelmshafen. Trieste and Pola are the Austrian naval harbors. Russia has Cronstadt and Sebastopol at home, and Vladivostok in the Amur territory. In the United States the principal navy yards are located as follows: New York (Brooklyn, N. Y.); Mare Island, Cal.; Norfolk (Portsmouth, Va.); Portsmouth, N. H. (Kittery, Me.); Boston (Charlestown, Mass.); League Island (Philadelphia); Washington, D. C.; and Pensacola, Fla. Besides the navy yards there are several naval stations, the important ones being at Boston, Mass.; Newport, R. I.; Indian Head, Md.; Norfolk, Va.; Bremerton, Wash.; Port Royal, S. C.; Portsmouth, N. H.; Philadelphia, Pa.; Cavite, Philippines; San Juan, Porto Rico; Tutuila, Samoa; Guam, Ladrones; Havana, Cuba; Honolulu, Hawaii; Sitka, Alaska; and Yokohama, Japan. In the early history of the United States navy, nearly all the vessels were built and equipped at the navy yards. The six wooden frigates used in the Civil War were there constructed, but the modern steel warships have been built chiefly by contract, by private builders, so that the navy yards now are used mainly for repairs.

Navy of the United States, The. The American navy came into existence in 1775 after the close investment of Boston by Washington had cut off all supplies to the British troops, save such as might arrive by water. To intercept these, some small vessels were armed and manned by New England seamen, first under the auspices of Rhode Island and Connecticut, and afterward by authority of the Congress which organized a Naval Committee with John Adams at its head. These little craft not only deprived the enemy of succor, but captured enough prizes to furnish the colonial army with war material, without which it could not have continued hostilities.

Early History.— In 1776, the navy had 31 cruisers mounting 586 guns, and no less than 136 privateers mounting 1,360 guns had also been fitted out. Including the flotilla on Lake Champlain, the government war vessels in service during the Revolution numbered in all 64, carrying a total of 1,242 guns. This force captured 196 vessels worth about $6,000,000, and the privateer auxiliaries, numbering 792, mounting over 13,000 guns, took 600 British ships, valued at $18,000,000. Insurance on British bottoms rose from two to fifteen per cent. This unprecedented destruction of British commerce, and the fact that the Colonies were literally supporting their forces from captured British goods, were among the strongest arguments which led to peace.

The Hancock, Randolph, Raleigh and other cruisers authorized by Congress were excellent ships, and the Alliance and Confederacy built toward the close of the war had no superiors afloat. They were mainly armed with 4- to 18-pounder guns. Progress, however, stopped when

independence was achieved, and the vessels were sold and men discharged. In 1794, a law re-establishing the navy under the secretary of war was enacted and six frigates authorized. Of these, three were constructed, the Constitution, 44 guns, 1,576 tons; Constellation, 36 guns, 1,265 tons; and United States, 44 guns, 1,576 tons. The Constitution is still afloat. Three were abandoned and the material sold. Under the pressure of French spoliations, however, the navy was increased and at the beginning of the quasi-war with France in 1798 it aggregated 22 ships with 456 guns and 3,484 men. This little force during the two and a half years of hostilities captured 84 French armed vessels mounting over 500 guns. The military discipline of the navy here begins: the American officers, largely recruited from merchantmen, learned from the commanders of the British war vessels in the West Indies, the traditions and customs of the older service. Then also came in the carronade or short gun, with little penetrating but great smashing power. At the end of the French war, another reduction of the navy took place. The theory that ships and guns could be called into existence when needed, as easily as log cabins, even at that early day, had become well rooted. Accordingly after cutting our force down to 15 vessels, we deemed it wise to present the Dey of Algiers with 26 barrels of silver dollars and the fine frigate Crescent to induce him to let our commerce alone. Tripoli in her turn, being thus encouraged, demanded special blackmail. Thereupon the navy once more rejuvenated, not merely destroyed the Barbary pirates, but emerged from the war in 1805, a sea power hereafter to be taken into account in the world's diplomacy. It was during these campaigns that disciplinary routine was so highly perfected by Commodore Edward Preble that it has remained with little substantial alteration to the present day. It was then also for the first time that the American navy was accorded all the formal honors of a national service by the war-ships of other countries.

War of 1812.— When the War of 1812 with Great Britain began, the navy had 17 ships aggregating 15,300 tons and carrying 442 guns and 5,025 men. It had no yards, no docks, no adequate means of any sort for repair or refitting. The British navy, fresh from the victories of Trafalgar and the Nile, had over seven times this force on the North American station alone. Within seven months the United States ships had reduced three British frigates to wrecks and taken 500 merchantmen — a result which astounded the world. The Constellation 55 guns destroyed the Guerrière in 40 minutes and the Java in one hour and 55 minutes, and the United States 54 guns dismantled the Macedonian 29, in about an hour and a half. The subsequent sloop actions were almost equally decisive. The noteworthy fact of these duels was the destructive character of the American fire — which literally tore the British ships to pieces and converted their decks into slaughter-houses. Three prominent factors contributed to success.

1. The United States ships, and especially the frigates were larger — 12 feet longer — and at the same time more easily maneuvered than any which had ever before been built. The sloops-of-war outclassed those of foreign navies at every point.

2. The frigates concentrated the power of a ship of the line. They mounted long 24-pounders in broadside— an innovation startling for the times. To the Guerrière's 32 long 18's and 16 short 32's the Constitution opposed 30 long 24's and 24 short 32's. When she fought the Java she had increased the number of her long 24's to 32, so that while decreasing the number of her short guns to 22, she had augmented their size to 24-pounders. That gave the combination of low power, heavy smashing projectiles with relatively high power penetrating projectiles which characterized the navy armament for many a year afterward.

3. The American gunners aimed their guns. They had been taught, as their fathers from the backwoods who had harried the Hessians had been taught, to fire at targets; to use their long cannon as they used their long fowling pieces and to send round shot into hulls at the water line, just as they were accustomed with their rifle bullets to bring down ducks on the wing. The British system then involved no gun pointing. The carronades had no sights and were laid level — point blank — with a range of about 500 yards. They were fired with the same hope of hitting something which King George's grenadiers or those of his serene Highness of Waldeck cherished when they presented fire-lock and pulled the trigger in one motion. So long as shot cut up sails and rigging and so impaired motive power the desired end was attained. The bull-dog Briton could then lay his ship close aboard the enemy and finish the fight with boarders and cutlasses. But the handy American ships kept out of point blank range. Their long 24's enabled them to do this and at the same time deliberately to drill holes in the British water line, while occasionally anticipating the yet distant shell fire by sending slow heavy balls against the wooden sides and annihilating whole gun's crews with the resulting shower of splinters. That is how the Wasp cut up the Frolic in 43 minutes and the Hornet demolished the Peacock in just 11 — while incidentally demonstrating the superior advantages of firing on the down roll of the ship in order to convert the adversary into a sieve, instead of on the up roll which merely clipped his wings.

In the war of 1812, the regular navy numbering but 23 vessels carrying in all but 556 guns, captured 254 of the enemy's craft. The value of the prizes taken by the navy and the privateers jointly was over $45,000,000. The cost of British marine insurance became almost prohibitive, 13 guineas per £100 was paid to insure vessels crossing the Irish Channel. So great was the injury to British commerce that in June, 1813, flour in Great Britain was $58 per barrel and lumber $72 per 1,000 feet. Before the war was over, the English were building ships on the "exact lines" of the American 44-gun frigates, and cutting down some of their most famous line-of-battle ships to compete with them. After peace had been secured, the permanent establishment of the navy was fixed at 12 ships of the line, 14 first class frigates, 3 second class frigates, 6 sloops-of-war and a proportionate number of smaller vessels. The more famous craft built between 1814 and 1825 were the 74-gun ships Washington, Franklin, Columbus, Ohio and Delaware, which were armed with 12 eight-inch and 70 32-pounder guns. For a time, the

North Carolina with 102 guns in three tiers of port-holes on her towering sides was regarded as the most powerful war-ship afloat. Meanwhile the possibilities of steam war vessels were looming up. Robert Fulton had built the Demologos in 1813, which not only was propelled by a midships paddle wheel — but had a queer collection of innovations, notably a battery of long 32-pounders supplemented by a 100-pounder submarine gun, and apparatus for discharging steam into an enemy's hull. She was accidentally blown up in 1829 and was succeeded by the wooden steam battery Fulton the Second, built in 1837 which, however, proved a failure. Four years later, the Mississippi and Missouri, side wheel steamers, were constructed and they were followed in 1847 by the Susquehanna and Powhatan — all excellent and serviceable vessels. The value of having the motive power beneath the water line had, however, already attracted attention to the screw propeller. In 1844, the Princeton, designed by Captain John Ericsson, the first screw steam war vessel ever built, was launched. She carried two long 225-pounder built-up guns, capable of piercing 4½ inches of wrought iron, and the first of their type. She was broken up in 1849 — but was in service long enough fully to demonstrate the naval importance of screw propulsion. The engineer corps of the navy (amalgamated with the line in 1899) was organized by act of 31 Aug. 1842, and in 1845 the United States Naval Academy (q.v.) was established at Annapolis.

The Civil War.—The screw steam war vessel was now fully developed and those of our navy were as graceful as yachts and the most formidable of their class. Between 1856 and 1859, we built the Niagara, Colorado, Merrimac, Wabash, Minnesota and Roanoke frigates and the Brooklyn, Lancaster, Hartford, Richmond, Pensacola, Pawnee, Michigan, Narragansett, Dacotah, Iroquois, Wyoming and Seminole sloops, some of which still survive. Meanwhile the Dahlgren shell gun began to replace the older type of smooth bore. When the Civil War broke out the navy, however, had become much reduced. Of the 90 vessels on the list, 42 were in commission and the rest unserviceable. The sailing ships still carried the ancient 32-pounders and 8-inch shell guns and only the steamers were provided with Dahlgrens — but these were regarded as monsters, their caliber having increased to 11 inches. It went to 15 and even 20 inches before the war closed — but the guns were very short, powder charges small and initial velocities seldom rose above 1,200 feet per second. These pounding weapons — true to the old principle — were supplemented by rifles mainly of the Parrott type, which lingered long after they had been proved about as dangerous to friend as to foe. When the war opened, the navy had 1,457 officers and 7,600 seamen — when it closed the officers numbered 7,500 and the seamen 51,500 — 208 additional vessels were built and 418 purchased. The total number of Confederate or British vessels captured or destroyed was 1,504, valued at $31,000,000, and the net proceeds of property seized on the blockade which was efficiently maintained over more than 3,000 miles of coast was $20,501,927. The cost of the navy throughout the Civil War was about $314,000,000, equal to only 9.3 per cent of the government expenditure for the whole period of four years and four months. The total number of ships of all classes in the navy in December 1864 was 671.

The great naval development of the Civil War was the Monitor, a raft-like vessel 172 feet long over all, of 41½ feet beam and 11⅓ feet depth, of hold plated with five layers of 1 inch iron on her hull and 8 layers on her single steam rotated turret wherein were installed two 11-inch Dahlgren guns. She revolutionized marine warfare and made the wooden steam frigate about as archaic as the Roman trireme. To a limited extent also (especially in the Confederate iron clads Virginia and Tennessee and the Federal so called "tin-clads" of the Mississippi) the armored casemate was subjected to test — but it is only of comparatively late years and following the great improvements in armor that the casemate has assumed a really important place in naval construction.

Reorganization.— After the Civil War, the navy as usual was rapidly reduced — the total number of vessels in commission in the fall of 1866 being but 115. The monitors were laid up at League Island and gradually destroyed. Five which still survive, though practically useless, were permitted a brief harbor service during the Spanish War. Two, however, of the more formidable class, the Miantonomah and the Monadnock, made long voyages respectively to Europe and around Cape Horn — thus for the first time demonstrating the sea-going capacity of low freeboard turret ships and dooming to final extinction the wooden man-of-war. Gradually but steadily the depletion of the navy list continued and vessel after vessel was sold. Many were broken up under the law decreeing destruction if needed repairs should be found to cost more than 20 per cent of the value — and finally in 1881, so far as ships went, the country was little better than defenseless. In July of that year we had as the steam navy, 13 so called first rates (all of wood of from 2,840 to 3,173 tons measurement) of which one, the Tennessee, was at sea and four were ancient craft still on the stocks and never launched; 20 second rates (929 to 2,300 tons, all wooden but one) and most of these old-fashioned and unserviceable; 27 third rates (410 to 918 tons), again all wooden but four, and some of the Civil War monitors. The rest of the navy was made up of wooden sailing ships, two of which had served in the War of 1812, including some that became all but worn out decades earlier while chasing pirates in the West Indies and slavers on the African coast. The one sea-going flagship Tennessee (plus "repairs") in ten years of active service gradually cost $3,800,000 and was ultimately sold for $34,555. Numerous other vessels built in the interval since the Civil War had meanwhile gone almost immediately from shipyard to scrap heap. "It is often the subject of wonder," says the secretary of the navy in his report for 1887, "what has become of the $70,000,000 spent upon war vessels since the close of the war in view of the fact that there is now no navy." The existing armament was as antiquated as the ships themselves. It consisted principally of 9-inch smooth bore and 8-inch rifle guns, all muzzle loading, and the latter had been economically concocted from old 11-inch Dahlgrens by inserting a wrought iron rifled tube in the bore. The only breech loaders in

the service were those which had been "converted" from the miserable 100 and 60-pounder Parrott rifles. This deterioration of the navy, however, extended no further than to the ships, and, at times, to the Navy Department. Throughout all that long period of corruption and decay the discipline of the service never wavered, the attainments of the naval officers constantly advanced, drills and target practice were as scrupulously maintained on wretched wooden craft which the poorest foreign iron clad could send to the bottom with ease, as if they had been held on the most powerful of battleships, and although we had, at most, only 55 antiquated ships, every one of them too slow to run away from and too weak to fight with a war vessel of the modern build and equipment, none the less all were ready to do their best — inadequate as it was — instantly and at all times. The ships of the United States Navy have often become weak in numbers and bad in construction, but the men who handle them have never retrograded. In quality the personnel of the United States Navy has always been the best.

It was in 1881 that Secretary Hunt appointed an advisory board to determine the requirements of a new navy. It recommended 21 armored vessels besides 70 unarmored, together with rams, and most significant of all declared that the material of construction should be steel. That was the knell of the iron navy — although as a matter of fact, iron had never fully replaced wood. Meanwhile there was not a plant in the United States capable of making forgings for guns of more than 6-inch caliber — nor one able to make armor plate or torpedoes or machine guns. In May 1887 contracts were signed with the Bethlehem Iron Company for gun forgings and armor plates and in the same year the now great naval gun factory in the Washington Navy Yard was begun.

The Modern Navy.—The first vessels of the new steel fleet were the Dolphin (1884) and the Atlanta, Boston, and Chicago (1885). The increase after 1888 was rapid, the outbreak of the Spanish War of 1898 finding the navy equipped with 77 vessels, including several coast line battleships such as the Iowa, Indiana and Oregon, and the powerful armored cruisers New York and Brooklyn. The war developed the remarkable preparedness of the navy, which practically annihilated that of Spain in a campaign of 110 days. The chief naval event apart from the battles of Santiago and Manila was the famous rush of the Oregon from San Francisco to Jupiter Inlet, Fla., around Cape Horn, a distance of some 14,000 miles in 68 days, which she accomplished without accident, arriving in condition for immediate service.

The navy of the present day is summarized below:

Battleships.—These are distinguished by the arrangement of their turrets and caliber of guns therein. The largest vessels are those of the Louisiana class. They measure 16,000 tons displacement and are about 450 feet in length. The fastest ships — 19 knots per hour — are those of the Georgia class. The chief innovation in turret arrangement is that in which smaller turrets are directly superposed upon larger ones, the large turret having two very heavy guns and the upper or superposed turret, two guns of lighter weight. There has been much controversy over this construction. The classification is as follows:

(*a*) Two Turrets, 12″ guns, Maine, Missouri, Ohio, Texas.
(*b*) Two Turrets, 13″ guns, Alabama, Illinois, Wisconsin.
(*c*) Two Turrets, 13″ guns, and two turrets with 8″ guns superposed, Kentucky, Kearsarge.
(*d*) Two Turrets, 12″ guns, and two turrets with 8″ guns superposed, and two additional 8″ turrets, Virginia, Rhode Island, Georgia, Nebraska and New Jersey.
(*e*) Two Turrets, 12″ guns and four turrets with 8″ guns, Louisiana, Minnesota, Mississippi, Kansas, Iowa, Vermont, Connecticut, and Idaho.
(*f*) Two Turrets, 13″ guns, and four turrets with 8″ guns, Indiana, Massachusetts, Oregon.

Armored Cruisers.— The largest of these vessels are of 14,500 tons displacement, 502 feet long and are capable of steaming 22 knots per hour. They have armored turrets and are classified as follows:

(*a*) Four armored turrets with 8″ guns, Brooklyn.
(*b*) Two armored turrets with 8″ guns, Colorado, California, New York, Pennsylvania, South Dakota, West Virginia.
(*c*) Two armored turrets with 10″ guns, Tennessee, Washington.

There are four single turret harbor defense monitors: Arkansas, Florida, Nevada and Wyoming each carrying two 12-inch and four 4-inch guns, and six double turret monitors, Amphitrite, Monadnock, Miantonomah, Monterey, Puritan and Terror. The last named group — excepting the Monterey — have iron hulls and steel turrets. The Monterey has two 12-inch and two 10-inch guns. Of other vessels the numbers are as follows: Protected cruisers (unarmored steel vessels) 23, unprotected cruisers 3, gunboats 13, light draft gunboats 3, unarmored composite vessels (gunboats) 8; besides iron and wooden craft and small gunboats under 500 tons displacement, tugs, etc.

As compared with other navies, that of the United States stands as follows, all vessels authorized (1904) and building being considered. Battleship strength: Great Britain, first; France, second; Germany, third; Russia, fourth; United States, fifth; Italy, sixth, and Japan seventh. Armored cruiser strength: Great Britain, first; France, second; United States, third; Russia, fourth; Germany, fifth; Italy, sixth; and Japan, seventh.

Guns.—All forgings for naval guns are made of open hearth steel containing nickel. The use of nickel in steel for gun forgings while only of recent development has been found to impart very desirable qualities which vary greatly according to the amount of nickel contained. In general the presence of 3.25 per cent of nickel increases the tensile strength and elastic limit without causing a corresponding reduction in elongation and contraction of area; and the elastic limit is also increased relatively to the tensile strength. This condition indicates toughness. Crystallization after forging is also avoided; and a fine granular or amorphous condition results. This steel is more sensitive to temper, and it is in tempered steel that the improved qualities are most apparent. As shown by the ballistic tests of armor plate, the presence of nickel also materially increases the resistance to shock. Guns are classified into (1) main battery guns, (2) secondary battery guns, (3) field guns and (4) small arms. Main battery guns are either (1) heavy caliber and turret guns, which include 13-inch, 12-inch, 10-inch,

and 8-inch, or, (2) intermediate caliber guns which are of the ordinary rapid fire types, represented by the new 7-inch, the 6-inch, the 5-inch and 4-inch guns. All guns of a caliber less than 4 inches are secondary battery or light-caliber guns. All guns of the main battery and a large part of the secondary are of the built up type, the heavy gun having a steel tube jacket, jacket hoops, locking hoops and chase hoops; the last, in recent designs, being carried to the muzzle. The newer types of naval guns are designed for a muzzle velocity of about 3,000 F. S., which represents a more than quadrupling of the muzzle energy with the same weight of projectile, achieved since 1879, when the maximum muzzle velocity was about 1,450 F. S. The term "high power gun" is applied to all having a muzzle velocity of over 2,500 F. S. The interrupted screw and conical spiral thread systems of breech closure are used for all guns of and above 3 inches in caliber. For handling the larger guns hydraulic and electric power are used: and, in the newer vessels, electric power exclusively. Large guns are fired by electricity. The 12-inch gun throws a projectile weighing 850 pounds and is capable at 2,000 yards of penetrating a thickness of 21 inches of either Krupp or Harvey armor. The 7-inch gun throws a projectile of 165 pounds and at the same range will penetrate about 9.7 inches.

The projectiles for large guns are pointed armor-piercing shells of the best quality of steel fitted with a soft steel cap at the extremity and common shell of forged steel and cast iron. Smokeless powder is solely used except for filling shell and ignition purposes. The smokeless powders are all nitro-substitution products and their chief characteristic is that very nearly their entire bulk turns into gas. The present development of naval guns is in the direction of increasing accurate and quick control. Modern 6-inch guns are being fired from ships eight or ten times per minute at targets about the size of the ship, and a mile distant and hitting the target at every shot. The weight of the 6-inch gun with all its turning parts is about 25,000 pounds, and this is directed by one man. There is also a tendency to increase the weight and length of guns, that of the 6-inch gun having augmented from 11,000 to 16,000 to 18,000 pounds. So also the strength of gun metal is increasing. In the large guns it is now equal to a strain of about 50,000 pounds per square inch —and in smaller guns runs as high as 75,000 pounds.

Submarine Torpedoes are of the Whitehead type, driven by a screw propeller actuated by compressed air and controlled by the gyroscope. With an air pressure of 1,500 pounds per square inch, a speed of 30 knots per hour for 1,200 yards has been attained and, with increased pressure and superheating devices, a speed of 35 knots is apparently possible. The desirability of underwater torpedo tubes in ships is in controversy. The great weight of naval opinion is in favor of them. Torpedoes are certainly effective at ranges of 2,000 yards and under, and war vessels unprovided with them lack a weapon of offense, the absence of which is demoralizing to the crews and distinctly disadvantageous.

Armor.—Two kinds of face-hardened steel armor are used in the navy, the Harvey and the Krupp, the former being employed for plates under five inches in thickness. In both, the face of the plate is hardened to a certain depth, leaving the back of tough steel to serve as a support. Wood backing is obsolescent. Krupp plates are used for the main side-belt armor, turrets, conning tower, casemate and intermediate battery protection of battleships. Harvey plates down to 3 inches in thickness are employed for side armor plates, bulkheads, etc. For sighting hoods and other light structures, homogeneous nickel steel is chosen. For the purpose of design it is assumed that Krupp armor will keep out projectiles of a caliber equal to its thickness at moderate fighting ranges; but this in practice is greatly modified by the soft capped projectile which gives an increased penetrating efficiency of about 20 per cent at normal impact. As between guns and armor the gun is ahead. At present 12-inch guns using 850 to 1,000 pound projectiles are mounted in turrets clothed with 12-inch armor. These turrets can be penetrated at any distance at which the projectile is likely to hit, unless the impact is very oblique. Similarly the 6- or 7-inch guns of ships can penetrate the best 6- and 7-inch armor.

Boilers and Engines.— Two kinds of boiler are employed in the large vessels, namely, the steel cylindrical Scotch or water tank and the tubulous or water tube boiler. The principal types of water tube boiler adopted for the battleships are the Babcock & Wilcox and Niclausse. For torpedo boats and destroyers the Mosher, Normand, Seabury and Thorneycroft water tube generators are used. Engines are usually of the two-screw-vertical triple-expansion type.

Navy Organization.—The President of the United States is the commander-in-chief of the navy. Its affairs are administered by the Navy Department, of which the secretary of the navy is the head. The assistant secretary of the navy performs such duties as may be assigned him by the secretary, the most important being the supervision of naval stations in insular possessions, the Marine Corps, War College, building of ships in navy yards and fitting of vessels for sea. The navy is governed by the Articles for the Government of the United States Navy, and statutes of Congress, orders of the President and secretary and a code called Regulations for the Government of the Navy of the United States, last published 1900.

The business of the Navy Department is distributed as the secretary deems expedient among eight bureaus. The Bureau of Yards and Docks controls docks and buildings in Navy Yards. The Bureau of Equipment provides coal, all equipments of ships and electrical appliances afloat, and supervises the Hydrographic Office and distribution of charts therefrom, the Naval Observatory, Nautical Almanac and Compass offices. The Bureau of Navigation promulgates orders, regulates details of officers and enlistment of men, supervises the Naval Academy and all naval educational institutions, the Naval Home, keeps the service records and looks after discipline. The Bureau of Ordnance has charge of armor and armament of all kinds and mechanism thereto pertaining, besides governing the Torpedo Station, naval proving grounds and shore magazines. The Bureau of Construction and Repair designs, builds and repairs ships and supervises docking them. The Bureau of Steam Engineering designs, builds and repairs steam

machinery. The Bureau of Supplies and Accounts buys provisions, clothing, small and contingent stores and keeps the accounts of officers and men. The Bureau of Medicine and Surgery looks after the health of the force and controls all laboratories, naval hospitals and dispensaries. The office of the Judge-Advocate General of the Navy is independent of the bureaus and takes charge of courts-martial and courts of inquiry, examines claims against the Department and attends generally to its legal work.

There is a loose sort of co-ordination between the bureaus, and the chiefs form a quasi-cabinet for the secretary. He is not bound by their advice and sometimes disregards it. Chiefs of Bureaus are naval officers nominated by the President and confirmed by the Senate to their office, the term of which is four years. They hold the rank of rear-admiral during incumbency, as does the Judge-Advocate General that of captain in the navy or colonel in the marine corps. The policy of the navy for the last half century has been against permanent officials in the bureaus. It has required officers of all grades to perform short tours of duty in them, so that there has always been an excellent understanding of needs and capacities between the administration and the fleet.

At the present time (1904) a proposition for a general staff to submit plans and policy to the secretary, and then under his authority to direct their execution, thus co-ordinating the work of the bureaus and ensuring permanent and systematic control of the military by the civil power is under discussion. There are already certain permanent boards of naval officers which take part in the administration. The General Board, presided over by the Admiral of the Navy, considers questions of naval policy and strategy and advises the secretary. The Board of Inspection and Survey inspects and reports on the efficiency of ships in commission. The Lighthouse Board controls the lighthouse establishment. For the distribution of navy yards and naval stations see NAVY YARDS. The navy provides vessels and officers for the Commission of Fish and Fisheries and for the nautical schools of Massachusetts and New York. It also maintains naval attachés at the United States embassies and legations at London, Paris, St. Petersburg, Berlin, Rome, Vienna, Tokyo and Peking. Jointly with the Treasury Department it manages the lighthouses and provides officers for their inspection.

Personnel.—Officers are commissioned or warranted. Commissioned officers belong either to the «line» or to the «staff.» The grades of line officers and the number allowed by law in each grade are admiral 1, rear admirals 18, captains 70, commanders 112, lieutenant-commanders 170, lieutenants 300, lieutenants, junior grade, 75, ensigns and midshipmen, indefinite. The staff officers include the Medical Corps, consisting of 15 medical directors, 15 medical inspectors, 56 surgeons, 55 passed assistant surgeons, and 53 assistant surgeons; the Pay Corps of 13 pay directors, 14 pay inspectors, 40 paymasters, 30 passed assistant paymasters and assistant paymasters indefinite. The chaplains of various grades number 24; the professors of mathematics 12, naval constructors 43, civil engineers 24, and admiral's secretary 1. All line officers, excepting a few yearly appointed from the warrant officers, are graduated from the United States Naval Academy (q.v.). Promotion up to rear admiral is by seniority only — subject to physical and professional examination at each step. The office of admiral is personal and expires with the individual holder. The staff officers are promoted by seniority in their several corps. The warrant officers include boatswains, gunners, and carpenters, in each of which corps there are two grades, chief sailmakers, warrant machinists, pharmacists and mates. The great majority are appointed from the enlisted force. Chief warrant officers rank with but after ensigns. Promotion in the warrant grades is by seniority.

Enlisted Men.— Only citizens of the United States can be enlisted. At the present time (1904) they form 90.7 per cent of the enlisted force, 79.8 per cent being native born. The total enlisted force is 27,245 men. The recruit must be able to write and speak English, have no physical disabilities, nor be a deserter or a minor under 14 years of age. The age limits vary with the rating — thus on first enlistment, a landsman must be between 18 and 25, unless he has a mechanical trade, when he can enlist up to 35, which is for all ratings the maximum. The enlistment term is four years — no enlistments for special service are allowed. Re-enlistment requires proof of creditable discharge. Enlisted men are classified into chief petty officers, petty officers of the first, second and third classes, and seamen of the first, second and third classes. They are again classified into the seaman branch, artificer branch, special branch and messmen branch. The seaman branch includes such petty officers as boatswains' mates, gun captains, and the like, and ordinary seamen, landsmen, together with the three classes of naval apprentices. The artificer branch includes all the machinists, electricians, carpenters, firemen and coal passers, the special branch, the stewards, hospital attendants and musicians, and the messmen branch, the cooks, stewards and mess attendants. Petty officers are appointed by captains of ships from the enlisted force. Two years' service at sea is required for rating as ordinary seaman and four years for seaman. Gun pointers are selected for merit and any one is eligible who shows the necessary natural aptitude. Those who become expert receive as high as $10 per month in addition to their regular pay.

Apprentices are enlisted between the ages of 16 and 17 with the consent of parents or guardians and must engage to serve until 21. They are instructed in the rudiments at the training station at Newport, R. I., and at San Francisco, Cal., for six months and then go to the training ships for a year's cruise at sea, after which they are promoted from the third class to the second, and assigned to the fleet. One year later they are rated in the first class and are eligible for petty office. Their instruction is continued during their apprenticeship and they have other special privileges.

Pay.—The pay of the commissioned officers of the line at sea or on shore duty beyond sea is as follows: Admiral, $13,500; rear-admirals, first nine, $7,500; second nine, $5,500; captains, $3,500; commanders, $3,000; lieutenant commanders, $2,500; lieutenants, $1,800; junior

lieutenants, $1,500, and ensigns, $1,400. Officers of the medical and pay corps receive the pay of their corresponding grades. All salaries (excepting that of the Admiral) are reduced 15 per cent during shore duty in the United States. All grades below rear-admiral are entitled to longevity increase of 10 per cent for every five years' service, until 40 per cent of the full yearly pay of the grade is reached. Midshipmen receive $500 per year at the Naval Academy and $950 per year with the fleet. The maximum pay of chaplains is $2,800, of professors of mathematics and engineers $3,500, and of naval constructors $4,200. All warrant officers except mates, whose pay ($900) is stationary, receive $1,200 during the first three years after appointment, increasing after 12 years to $1,800. The pay of chief petty officers is from $70 to $50, other petty officers from $65 to $30, and seamen from $35 to $9 per month. There are various special allowances and rewards for particular service — for which see the yearly Naval Register. Retirement of officers is compulsory at age of 62, also for disability and under certain conditions under Act of 3 May 1899. It is voluntary after 40 years' service and above the grade of lieutenant commander. Retired officers (according to the law under which they retire) receive either three fourths or one half the sea pay of their grade on the active list or one half their leave pay. Enlisted men can retire after thirty years' service and attaining age 50 unless physically disqualified for duty. They receive three fourths of the pay in the rating they held when retired.

The Naval Home at Philadelphia (formerly called the Naval Asylum), built in 1832, provides a retreat for old officers and sailors.

Naval Education.—The educational institutions of the navy are the Naval Academy (q.v.) at Annapolis, Md., the War College at Newport, R. I., and the apprentice training stations at Newport and San Francisco. The Naval Academy founded by Secretary George Bancroft in 1845 as a school for midshipmen studying for promotion, is now the foremost naval college in the world. All of the line officers of the navy with a very few exceptions are its graduates. The students are midshipmen. They are appointed by the secretary of the navy on nomination of Senators and members of Congress and by the President. One midshipman is allowed at the Academy for every member or delegate of the House of Representatives, one for the District of Columbia, two for each State upon recommendation by Senators, and 15 appointed by the President. The course is four years at the Academy, eight months of each year being devoted to study at Annapolis and the remainder to cruises in the practice ships. This is followed by two years at sea prior to promotion to ensign. Candidates must be physically sound, not less than 5 feet 2 inches in height and between the ages of 16 and 20, and must pass a rigid entrance examination, which includes geometry, history and advanced geography. The course covers thorough technical education in gunnery, navigation, marine engineering, languages, law and all other branches required by a naval officer. The standard of efficiency demanded is at least 66⅔ per cent, from which no diminution is allowed. The proportion of graduates to freshmen has been hitherto about 44 per cent. The faculty is mainly composed of graduate naval officers. The new buildings of the Academy now (1904) approaching completion are to cost nearly $12,000,000 and form the most magnificent educational structures in the world. The War College, founded by Rear Admiral Stephen Bleecker Luce, U. S. N., in 1883, is established at Newport, R. I. It is not a school, but a place for discussion of naval problems by officers of all grades, forming committees in attendance usually during the summer months. It specially considers matters of strategy, planning of campaigns, etc.

The Marine Corps was established by the Continental Congress in November 1775. It is a part of the Navy and has participated in all its actions. Its grades and pay correspond to those of the Army. It has 1 major-general (commandant), 5 colonels, 50 lieutenant colonels, 10 majors, 55 captains, 55 1st lieutenants and 57 2d lieutenants. Retirement is compulsory at age 64 or for disability, and is voluntary at 30 or 40 years under different laws. Officers are very commonly appointed 2d lieutenants directly from civil life, although many have been selected from graduates of the Naval Academy.

Naval Policy.—It is the policy of the United States, not to have the largest navy, but one which shall be fully adequate for the maintenance of its peace and in every particular of the highest attainable efficiency. At the present time (1904) our naval armament is below the minimum for the work demanded of it. A battleship requires about forty months to build and it takes six years to produce a competent naval officer. So also it takes time to train men to handle the complicated mechanism which is essential to the modern war vessel. The training facilities of the country and the means for obtaining the enlisted force are inadequate. A Naval Reserve is necessary from which to draw men at once in case of need. A Naval Militia (q.v.) co-ordinated with the regular service is also of great value, especially for harbor and coast defense. Several States have established such militia, but its development has been greatly retarded by lack of proper national encouragement and support. The distribution of our naval force in time of peace is in two fleets and four separate squadrons. The North Atlantic fleet includes the east coast of the United States and West Indies, and is divided into the Battleship, the Caribbean and the Coast squadrons. The Asiatic fleet covers the east Asiatic coast and the Philippines and is divided into the Northern and Southern squadrons; the European Squadron, the South Atlantic Squadron which cruises on the east coast of South America, the Pacific Squadron, which ranges over the whole west coast of both continents, and the Training Squadron. See also NAVAL ARCHITECTURE; NAVY, HISTORY OF; NAVAL SERVICE, THE; NAVIES OF THE WORLD.

Bibliography.— For histories of the navy consult: Cooper's (1839); Maclay's (1895–9); Spears' (1897); also Aldrich's 'History of the Marine Corps.' A great deal of information will also be found in Hammersley's 'Naval Encyclopedia' (1881) and subsequent editions. Niles' 'Register and American State Papers' may also be consulted. The 'Official Records of the U. S. and Confederate Navies during the War of the Rebellion' contain all reports and like

matter, and are published by the Navy Department. Consult also file of the 'Army and Navy Journal' 1863 to date. For current progress, the yearly reports of the secretary of the navy and of the Bureaus — the publications of the Office of Naval Intelligence and of the United States Naval Institute are indispensable. For the Naval Academy, consult the history of that institution by Park Benjamin, and the yearly 'Registers' obtainable from the superintendent, which give all qualifications for entrance, course, etc. Information as to apprentices, enlistments, etc., are published by the Bureau of Navigation. Fullam and Ward's 'Text Book of Ordnance and Gunnery,' and Beig's 'Steam Boilers,' contain full data relative to their subjects. For government and organization consult 'Regulations for the Government of the Navy' (1900), and for Personnel and Stations, the current 'Navy Register.' For construction of ships consult 'Proceedings of the Institute of Naval Architects and Marine Engineers.

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Nawanagar, nạ-wā-nạ-gär'. See NOWANAGAR.

Naxos, năk'sŏs, or **Naxia,** näk-sē'ä, Greece, an island of the Ægean Archipelago, the largest of the Cyclades, lying east of Paros; length, 18 miles; breadth, 12; area, 170 square miles. It is hilly, beautiful, and extremely productive, yielding fruit, wine, oil, silk, wheat, and barley, while the higher grounds afford pasturage for cattle. Cheese, honey, and wax are exported, as well as wine, oil, fruit, and grain. There are prehistoric quarries of granite, marble, and serpentine; and emery exists in abundance, being exported in large quantities. The chief town or village is Naxos (pop. 2,000), near the northwestern part of the island, on a small bay with a harbor and insecure roadstead. In ancient times Naxos was celebrated for its wine, and played a prominent part in the legends of Dionysus or Bacchus, who is said to have found Ariadne here after she was deserted by Theseus. It was anciently inhabited by Ionians who had emigrated from Athens. Pop. (1889) 15,572.

Naylor, nā'lôr, **James Ball,** American novelist: b. Pennsville, Ohio, 4 Oct. 1860. He was graduated from Starling Medical College, Columbus, Ohio, in 1886, and has since practised medicine and engaged in literary work. He has published: 'Current Coins' (1893); 'Ralph Marlowe' (1901); 'The Sign of the Prophet' (1901); 'In the Days of St. Clair' (1902); etc.

Nazaræans, năz-ạ-rē'ạnz, a Jewish sect mentioned by Epiphanius. The term is probably derived from *Netsir,* a branch, that is, a branch of the true stock. They professed to revert to a patriarchal form of religion and thus to supersede Mosaic Judaism, canonized the 12 patriarchs, but did not exclude Moses and Aaron from their list of saints. According to them the law given to Moses was lost and the extant Pentateuch corrupt. While rejecting the sacrifice of animals and eating no flesh, they kept the Sabbath and the Jewish festivals. They were found in Galaaditis, Basanitis and other regions east of the Jordan.

Nazarene, năz-ạ-rēn', a designation of Jesus Christ. It appears in two forms in the Greek, *Nazarenos,* and *Nazoraios,* both derived from Nazareth. Though this designation occurs 19 times in the New Testament the authorized version only twice renders it "Nazarene" (Matt. ii. 24; Acts xxiv. 5), elsewhere by the words "of Nazareth." The demoniac uses it in addressing Jesus in the synagogue at Capernaum (Mark i. 24; Luke iv. 34); the people to Bartimæus (Mark x. 47; Luke xviii. 37); the soldiers who apprehended Jesus (John xviii. 5–7); the servants at his trial (Matt. xxvi. 71; Mark xiv. 67); Pilate in the superscription (John xix. 19); the disciples on their way to Emmaus (Luke xxiv. 19); Saint Peter (Acts ii. 22; iii. 6; iv. 10); the false witness against Stephen (Acts iv. 14); the ascended Jesus (Acts xxii. 8); and Saint Paul (Acts xxvi. 9). At first it was applied to Jesus as naturally indicating his birthplace. The Galileans were not highly esteemed; their dialect was debased; the population had become degraded through admixture with the heathen; they were seditious, hence the accusation against Saint Paul as "ringleader of the Nazarenes." Nazareth was a small, obscure town of Galilee, hence Nazarene became a term of reproach and is still used by Arabs as a general designation for Christians; and the Indian Mutiny is said to have been encouraged by a pretended ancient prophecy that the Nazarenes should be expelled from Hindustan after dominating it for 100 years. See NAZARETH.

Nazarenes, nickname of a certain school of German painters who both in coloring and technique professed to reproduce the method and style of Italian painters of the 14th and 15th centuries, Giotto, Fiesole, Perugino. The leaders in this movement were Overbeck, Schadow, Veit, Schnorr and Carolsfeld, who founded at Rome "The Congregation of the Brothers of Saint Isidore." Schnorr and Schadow later on left the brotherhood. A similar movement in England was initiated by the Pre-Raphaelites (q.v.).

Nazarenes. See EBIONITES.

Nazareth, năz'ạ-rĕth (ancient NASSRA, that is, "flower"; modern EN-NASIRAH, ĕn nä-sē'ra), Palestine, a city noted for being the home of Jesus Christ. It is about 20 miles in direct line from the Mediterranean Sea, 15 miles from the Sea of Galilee, and 70 miles north of Bethlehem (q.v.). The distance to Bethlehem by the usual route is 110 miles. The city is built in the form of an amphitheatre, in a valley which is 1,115 feet above the level of the sea, and surrounded by hills. On the south is the plain on which the Nazarenes threshed their wheat, and farther away is the plain of Esdraelon. From the summit of the hills which surround the city a fine view of the surrounding country may be obtained. The Nazareth of the time of Jesus extended farther up toward the summit of the hills (Luke iv.). The place was the home of Mary, the mother of Jesus, and of Joseph, the husband of Mary. The city is not mentioned in the Old Testament; but it is referred to several times in the New Testament (Luke i. 26; John i. 46, and other places). The streets are narrow, but well paved, the houses are principally of stone. The house in which Jesus lived was held in esteem in the early ages of Christianity, but when the place came into possession

of the Moslems, Christians who approached the village were in great danger. At the time of the crusades (q.v.) the place was ornamented and kept in good order, but again in 1291 the Moslems gained possession and the village declined. The Franciscan Fathers erected a church and monastery in Nazareth in 1300, but they were expelled in 1362. They returned in 1468, but were obliged to leave in 1542, and returned in 1620. They are now in Nazareth and under their auspices the Church of the Annunciation, and several other churches and chapels have been built. The Fathers give hospitality to all travelers who visit the place. The pilgrim house is called "Our Lady of America," as it was erected by the contributions of Roman Catholic Americans. The house in which the Holy Family lived is said to be now in Loretto (q.v.), in Italy. Some of the points of interest are the Church of the Annunciation, the fountain of the Virgin, the workshop of Saint Joseph, the church of the schismatic Greeks, church of the United Greeks, and the *mensa Christa* (table of Christ). Tradition relates of the last mentioned, that it is the rock upon which Jesus Christ took a repast with his disciples. Saint Francis of Assisi visited Nazareth in 1219; and Saint Louis, king of France, and his wife, visited it on 25 May 1251. The Franciscan Fathers have a school for boys, and the Ladies of Nazareth a school for girls. There is one hospital in charge of Brothers of Saint John of God, a school for boys under the Brothers of the Christian Schools, and a free dispensary and home for the aged in charge of Sisters. The population is estimated to be about 10,000; in 1897, by accurate report there were 2,400 Roman Catholics (including three rites), 2,000 schismatic Greeks, 100 Protestants, and 1,500 Moslems. Consult: De Hamme (translated by Rotthier) 'Ancient and Modern Palestine'; De Vogue, 'Les Eglises de la Terre-Sainte'; Roger, 'La Terre-Sainte'; De Hamme, 'Guide-Indicateur des Sanctuaires et Lieux historiques de la Terre-Sainte'; Stanley, 'Sinai and Palestine'; Smith, 'Historical Geography of the Holy Land'; Guerin, 'Galilee.'

Nazareth, Ky., in Nelson County; on the Louisville & Nashville railroad; two and one half miles from Bardstown (q.v.) and 39 miles south by east of Louisville. It is the seat of the mother house of the Sisters of Charity in Kentucky, an order whose members follow the rule of Saint Vincent de Paul, and who extend their work through 54 branch houses in several States. The area of Nazareth is 6,000 acres, encircled by woodlands beyond which rise the famous Kentucky Knobs. One of the sisters is postmaster of the government office and the long distance telephone supplies the need of quick means of communication with patrons. The convent building has a frontage of 1,000 feet, and is surrounded by well-kept lawns, adorned with shrubs and flowers, and a park of 100 acres. It has an art gallery which contains some valuable works of the great masters and some creditable work from the teachers and students. Two fine groups of bronze, life size, are near the entrance. The library contains about 6,000 volumes and is well furnished. The laboratory is supplied with up-to-date philosophical and chemical apparatus. The museum, a hall 80 by 75 feet, contains collections of historical souvenirs, shells, fossils, corals, minerals, stuffed birds and animals, botanical specimens, herbaria, fungi, and more than 100 specimens of wood from native trees, so arranged and classified as to show the bark and the grain of the wood. The exhibition hall, 165 by 75 feet, has a seating capacity of 2,500. The church, French Gothic, a gem of beauty, is gracefully arched, handsomely furnished, and perfect in all its appointments.

The founders of Nazareth were Right Rev. J. B. M. David of Bardstown and Catherine Spalding. Mother Catherine Spalding's mother was an elder; thus the first superior was a representative of two of the most prominent families of Kentucky. The convent was founded in 1812; the school in 1814; branch houses were established in Bardstown in 1818, and at Saint Vincent's, Union County, Ky., in 1820. Under the title, "Nazareth Literary and Benevolent Institution," the convent was chartered by the Legislature of Kentucky in 1829. The Sisters, following their vocation, having done heroic service when opportunities presented themselves. They gave personal service and all the aid in their power during the cholera epidemic in 1832 and 1833; they served in taking care of the soldiers during the Civil War; in 1878, 12 sisters died at their post attending to yellow fever patients, but their places were soon filled, for when volunteers were called for, every Sister offered herself. They have done work in Louisville during various visitations of smallpox and other contagious diseases. Out of the cholera of 1833 grew their first orphan asylum, Saint Vincent's, in Louisville.

Some of the most distinguished men of the country have been their patrons: Henry Clay, who sent his daughter, granddaughter and great-granddaughter to Nazareth; Judge Benjamin Winchester, John J. Crittenden, Judge John Rowan, Zachary Taylor, Jefferson Davis, George D. Prentice, Governor Charles Wickliffe, and many others. Some of the noted pupils of the school were Sarah Knox Taylor, daughter of President Zachary Taylor; Mary Anderson, Mrs. Charlotte McIlvain Moore, Mrs. James Meline, Mary Irwin, and a host of others.

The Sisters now number 820; they have houses in Kentucky, Tennessee, Arkansas, Mississippi, Ohio, Massachusetts, Maryland, and Virginia. They have 16 academies, 54 parish schools, six hospitals and infirmaries, five orphanages, and three homes. They have in their schools 16,300 pupils; in their hospitals 800 patients, and in their orphanages 550 children.

Nazareth, Pa., borough in Northampton County; on the Delaware, Lackawanna & Western railroad; about five miles north by west of Easton and 100 miles northeast of Harrisburg. It is near large anthracite coal fields and has considerable manufacturing. The chief industrial establishments are cigar factories, paper and hosiery mills, lumber and planing mills, carriage works, foundry, machine shops, lace factory, guitar factory, creamery, and large brick and coal yards. There is considerable trade in manufactures and coal. Pop. (1890) 1,318; (1900) 2,304.

Naz'arite. See NAZIRITE.

Naz'arites, a sect of Christians in Hungary, numbering about 80,000. They profess to

go back to the New Testament for their belief and practice; reject Sunday as a holy day of rest, though for convenience adopt it as the day of public worship, which any man of good standing in the church can hold, as they have no separated and ordained ministry. They observe Baptism and the Lord's Supper as sacraments, but refuse to take an oath or to serve in war. When a Nazarite is drawn in the conscription a substitute is provided either by his relations or the parish to which he belongs. The sect found an entrance into Hungary through two journeyman locksmiths, Denkel and Kropacsek of Szegedin in 1839; the locksmith Henesei became its Apostle and it rapidly grew from 50,000 members to its present number. The simple social life, charity and peacefulness of this sect puts them on a level with the followers of George Fox in English-speaking countries.

Nazirite, an Israelite who bound himself or herself to the service of Jehovah by a special vow, the obligations of which are stated in Numbers vi. 1–21. The word is derived from a Hebrew root meaning separation, and is sometimes translated in the Greek version of the Septuagint by a word that means sanctified or consecrated. The principal stipulations of the vow bound the Nazirite to abstinence from wine or strong drink and from the eating of grapes, and forbade him to cut or shave off the hair of his head, or to touch a dead body. The duration of this vow according to the Jewish canons could not be less than 30 days; though some took the vow for life. Samson, Samuel and John Baptist are mentioned in Scripture as perpetual Nazirites, of which there were two classes, those who were permitted to diminish their hair when it became too heavy, if they were willing to bring the three appointed sacrifices (Num. vi. 10–12); and those who were forbidden to diminish their hair, but could touch a dead body, as Samson did the jaw-bone of an ass, without being defiled.

The institution of Naziritism was intended to typify the separation and restraint of a holy life. The growth of the hair indicated the virility of heroic virtue; the flowing locks symbolized childlike simplicity, power, beauty, liberty and the unchecked employment of human faculties in the service of God. Maimonides speaks of the dignity of the Nazirites as being equal to that of the high-priest; according to Eusebius the historian (Hist. Eccles. ii. 23), Nazirites were the only Israelites, excepting the high-priests, who were permited to enter the Holy of Holies. Parents could dedicate their prospective children to the life of a Nazirite. No community life or separation from the engagements and enjoyments of domestic or social life was entailed by the vow, whose special object appears to have been to set forth symbolically among the people, in the person of separated devotees, useful and impressive lessons of submission to the law of holiness. Consult: Michaelis, 'Law of Moses'; Bähr, 'Symbolik des Mosaici Cultus'; Driver, 'The Books of Joel and Amos' (in the Cambridge Bible for Schools and Colleges 1897).

Neæra, nẹ-ē'rā, in Greek mythology, a name given to various nymphs; also a maiden mentioned by Horace.

Neagh, nā (local, nā'ăH), **Lough,** Ireland, in the province of Ulster, is the largest lake of the United Kingdom. It is situated about 12 miles west of Belfast, is 48 feet above sea-level, 16 miles long, has an average breadth of ten miles, a maximum depth of 102 feet, and an area of 98,255 acres. It is well stocked with trout, char, pullen, and other lake fish. It receives the waters of the Upper Ban, Blackwater, and Callan, and is drained into the North Channel by the Lower Bann. The Lough is connected by canals with Belfast, Newry, and the Tyrone coal field.

Neagle, nā'gl, **John,** American painter: b. Boston, Mass., 4 Nov. 1796; d. 1865. He was practically a self-taught artist although after his marriage with the daughter of Thomas Sully he received instruction and encouragement from that painter, and applying himself to portrait painting he rapidly grew in favor wth connoisseurs and was made director of the Pennsylvania Academy (1830), and in 1835 first president of the Artists' Fund Society of Philadelphia. Many of his most important works are at Philadelphia, where his parents had settled shortly after his birth. The full-length of 'Patrick Lyon at the Forge' (1826); and the portraits of Rev. Joseph Pilmore, Henry Clay, and George Washington are strong in drawing, harmonious in coloring and strikingly characteristic.

Neal, nēl, **Daniel,** English non-conformist clergyman and historian of the Puritans: b. London 14 Dec. 1678; d. Bath 4 April 1743. He studied at the Merchant Taylors' School, at a Dissenters' theological school in Little Britain, in Utrecht for two years and in Leyden for one; was assistant and then pastor of a congregation which met first in Aldersgate Street and later in Jewin Street; and wrote 'History of New England' (1720), which won him the honorary degree of M.A. from Harvard, and the great 'History of the Puritans' begun by John Evans but practically the work throughout of Neal (1732–8). The latter book won him a high reputation with the non-conformists, but is not free from bias. It brings the history of English Dissent down to 1689. Consult the 'Life of Neal' by Toulmin (1793).

Neal, David Dalhoff, American painter: b. Lowell, Mass., 20 Oct. 1838. He began his studies at the Munich Royal Academy, where he gained the Great Medal. He has painted many historical-romantic pictures and among them 'Mary Stuart and Riccio'; 'Oliver Cromwell Visits John Milton'; 'Nuns at Prayer'; 'In the Crypt'; 'Retour du Chasse'; etc. Among his portraits may be mentioned those of Adolph Sutro; Rev. Mark Hopkins; Judge Hoffman of California; D. O. Mills; Whitelaw Reid; etc.

Neal, John, American author: b. Portland, Maine, 25 Aug. 1793; d. there 21 June 1876. He had little schooling; was a clerk in Boston; removed to Baltimore in 1816, began to practise law and write fiction. He contributed largely to British periodicals, lived in England 1823–7, being secretary to Bentham part of that time, and was the first successful American author abroad. He was (1838) one of the earliest speakers in behalf of woman's suffrage, was attracted successively by phrenology, mesmerism,

and spiritualism, and probably introduced gymnastics into America. Neal was the patron and guide of several younger writers, notably Edgar Allan Poe. Under the name Jehu O'Cataract he wrote a bombastic poem 'Battle of Niagara' (1818). His novels include 'Randolph' (1823), in which he drew the portrait of William Pinckney so freely as to rouse Edward C. Pinckney to challenge the author; 'Brother Jonathan' (1825); and 'Rachel Dyer' (1828). He wrote the most of 'Paul Allen's American Revolution,' and much else with "marvelous rapidity." Consult his 'Wandering Recollections of a Somewhat Busy Life' (1869).

Neal, Joseph Clay, American journalist: b. Greenland, N. H., 3 Feb. 1803; d. Philadelphia, Pa., 18 July 1847. He edited the 'Pennsylvanian' in 1831–44 and later established the 'Saturday Gazette.' He wrote: 'Charcoal Sketches' (1837); 'Peter Ploddy and other Oddities' (1844); etc.

Neale, Edward Vansittart, English reformer: b. Bath, England, 1810; d. 1892. He was educated at Oxford, and became a Christian Socialist. He founded the first co-operative store in London and was instrumental in the establishment of numerous co-operative societies, mills, etc.; and visited America in 1875 in the interests of his work. He published: 'The Characteristic Features of Some of the Principal Systems of Socialism' (1851); 'The Mythical Element in Christianity' (1873); etc.

Neale, John Mason, English clergyman and hymn-writer: b. London 24 Jan. 1818; d. East Grinstead, Sussex. He was graduated from Trinity College, Cambridge, in 1840; became fellow and tutor of Downing College in that year; and from 1846 until his death was warden of Sackville College, East Grinstead. His ecclesiastical views were those of the most advanced wing of the High Church party. In 1839 he was a founder of the Cambridge Camden Society, later the Ecclesiological Society, and in 1854 established at Rotherfield the sisterhood of St. Margaret, transferred in 1856 to East Grinstead. In rebuilding Sackville College chapel in 1850 he added ornaments denounced by Gilbert, bishop of Chichester, who inhibited him from officiating in the diocese, but the inhibition was removed in 1863. Neale is said to have known 20 languages. His greatest work was in hymnology. As a translator of Latin and Greek Christian hymns he has perhaps never been equaled. Fully one eighth of 'Hymns Ancient and Modern' (1878) is by him. Chief among his renderings are 'Mediæval Hymns and Sequences' (1851); 'The Rhythm of Bernard of Morlaix' (1858), and 'Hymns of the Eastern Church' (1863). From the 'Rhythm' have been adapted the familiar 'The World is Very Evil,' 'Brief Life is here our Portion,' 'For thee, O dear, dear Country,' and 'Jerusalem the Golden.' He wrote also an important 'History of the Holy Eastern Church' (1847–51). In 1884 a selection from his writings was published. Consult: Julian, 'Dictionary of Hymnology,' pp. 785–90 (1892).

Neander, Johann August Wilhelm, yō'hän ow'goost vĭl'hĕlm nā-än'dĕr, German theologian and church historian: b. Göttingen 17 Jan. 1789; d. Berlin 14 July 1850. A Jew, his name was originally David Mendel. Upon his profession of Christianity in 1806 he assumed the name Neander ("new man"). After study of theology at Göttingen, he became professor at Heidelberg in 1812, and in 1813 at Berlin. At Berlin he lectured until his death, largely on church history, but also on ethics, New Testament exegesis, and systematic theology. His lectures were notable, and his literary activity great. He was the founder of modern church history, and beyond doubt the chief in that field in the 19th century. His motto, "Pectus est quod theologum facit," illustrates his method. He viewed Christianity, not, like either Supernaturalists or Rationalists, as a scheme of doctrine, but as a divine force; and its history as the study of human history in terms of that force. His principal work is the 'General History of the Christian Religion and Church' ('Allgemeine Geschichte der christlichen Religion and Kirche') (1825–52), translated by Joseph Torrey (12th ed. 1881), and more widely circulated in England and the United States than in Germany. This survey is based on a most careful use of the sources, and is marked by rigorous analysis. Neander's style here, as elsewhere, is somewhat involved at times, but free from pretentiousness. Schaff terms Neander "a giant in learning and a saint in piety." He wrote further 'Julian the Apostate' (1812; Eng. trans. 1850); 'St. Bernard' (1813); 'Memorials of the Christian Life in the Early and Middle Ages' (1822; Eng. trans. by Ryland 1852); 'History of the Planting and Training of the Christian Church' (1832; Eng. trans. by Ryland 1842); 'The Life of Jesus Christ' (1837; Eng. trans. by McClintock and Blumenthal 1848); and other works. Consult: Schaff, 'St. Augustin, Melanchthon, and Neander' (1886); Wiegand, 'Life' (1890).

Neanderthal, Prussia, a valley or ravine near the village of Hochdal, between Düsseldorf and Elberfeld, which came into prominence in 1857 by the discovery in a limestone cave at a depth of 60 feet, of the remains of a prehistoric man, of a hitherto unknown type. The peculiar dolichocephalic formation of the skull induced several anthropologists to regard it as typical of a separate race of cave dwellers, while others explained the abnormality as caused by disease during the lifetime of the individual; it is now regarded as a representative of the most ancient of European dolichocephalous people, of whom various remains have been found subsequently in Bohemia, France, and England.

Neap-tides are those which happen when the moon is nearly at the second and fourth quarters. The neap-tides are low tides in respect to their opposites, the spring-tides. See TIDES.

Neapolis, nẹ-ăp'ō-lĭs, Macedonia, the town where Saint Paul, as mentioned Acts xvi. 9–11, commenced his evangelizing work in Europe. It was the port of Philippi eight miles to the west, and was situated on Kavala Bay, near the site of modern Kavala in Turkey.

Nearchus, nẹ-är'kŭs, officer of Alexander the Great. He was a native of Crete and went to Amphipolis in the reign of Philip at whose court he formed a friendship with Alexander. Under the latter he was made governor of Lycia and other provinces in Asia Minor in 330 B.C. and about 329 B.C. accompanied Alexander in the Indian campaigns. In 326–5 he

commanded the great fleet built by Alexander at Hydaspes and conducted it from the Indus to the Persian Gulf, discovering on his way the mouths of the Euphrates and the Tigris. Upon the division of the empire which followed Alexander's death, Nearchus was made governor of Lycia and Pamphilia by Antigonus. He wrote an account of his voyage, which has been preserved in Arrian's 'Indica.' See Plutarch, 'Vita Alexandri'; Vincent, 'Voyage of Nearchus to the Euphrates.'

Nearc'tic Region, one of the primary faunistic divisions of the Earth (see ZOOGEOGRAPHY) according to the widely accepted scheme of Sclater and Wallace. It embraces all North America, as far south as the highlands of Mexico carry northern climatic conditions. The differences between its fauna and that of the northern parts of the Old World (Palæarctic Province) are, however, not sufficient, in the view of many students, to justify so primal a distinction; and the later tendency is toward uniting the Nearctic and Palæarctic «regions» into one under the name Holarctic region, or Arctogæa.

Nearsightedness. See SIGHT, DEFECTS OF.

Neat's-foot Oil, an oil obtained from the feet of the common ox.

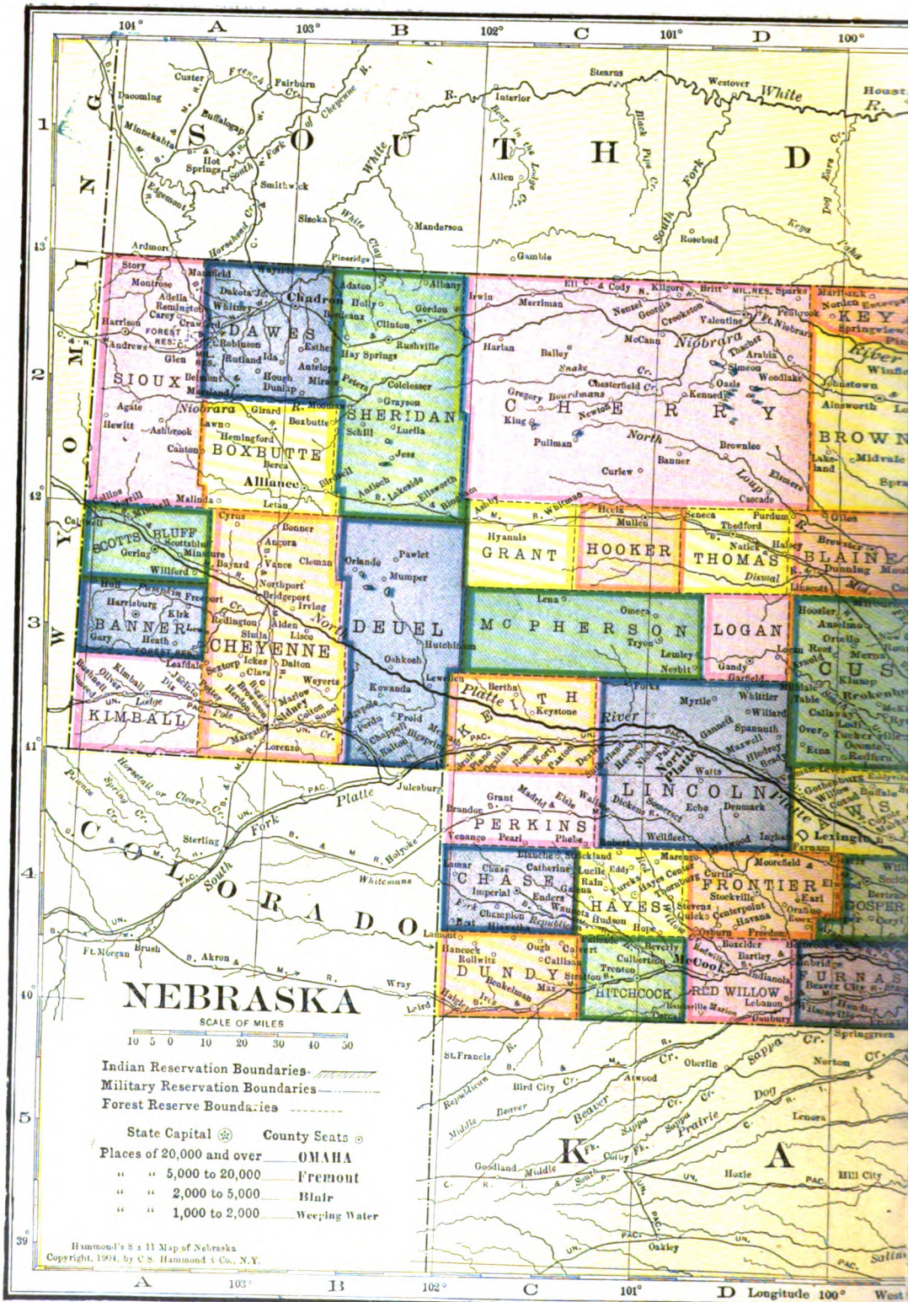
Nebo, nē'bō, Palestine, the biblical name of Jebel Neba, 2,643 feet high, a few miles east of the north end of the Dead Sea, the mountain of ancient Moab whence Moses viewed the Promised Land, and where he died (Deut. xxxii. 49; xxxiv. 1).

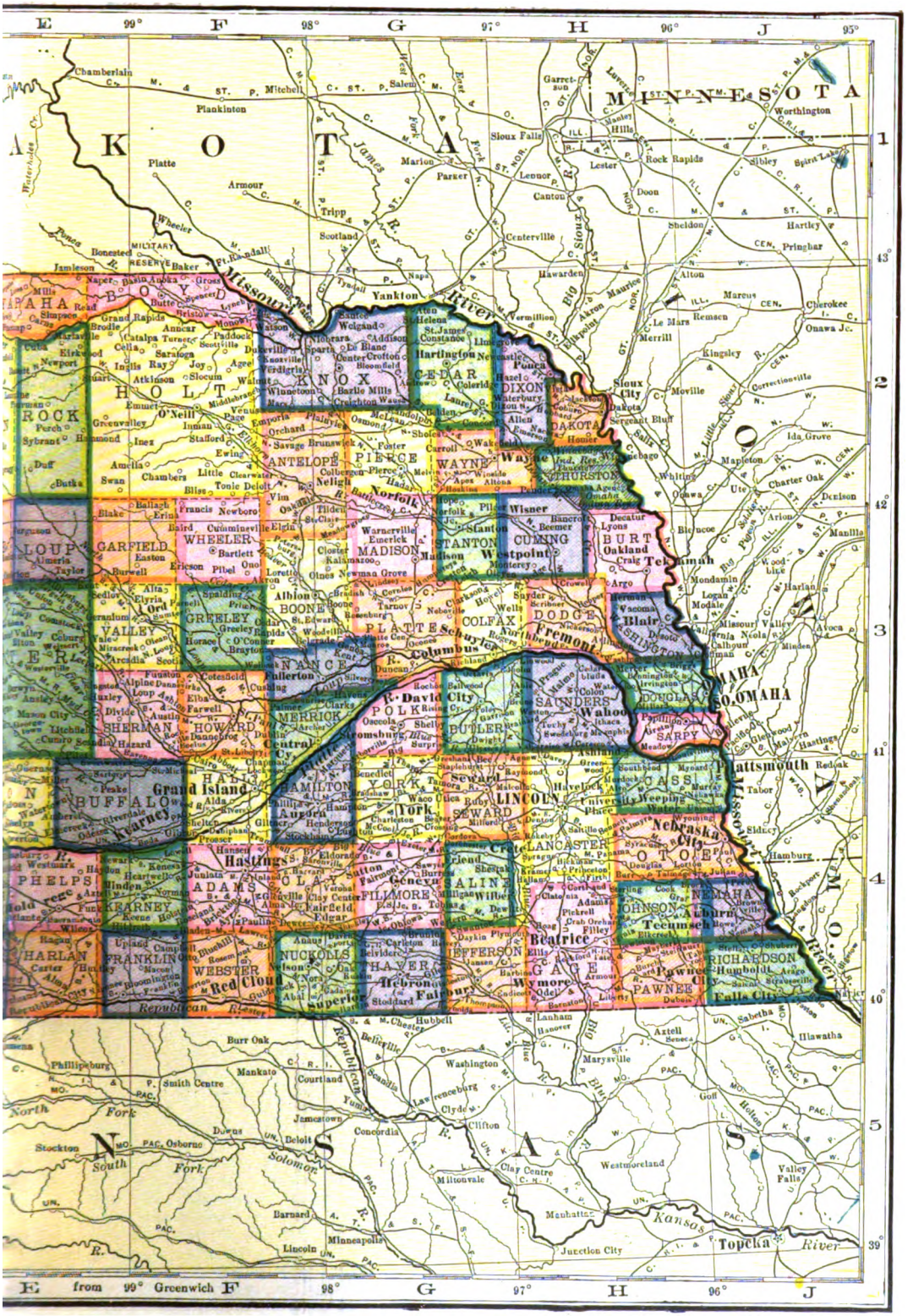
Nebo, or **Nabu,** in Babylonian mythology, an idol representing the planet Mercury. It was worshipped by the ancient Arabians, and among the Chaldæans and Assyrians from the fact that many compound proper names occur in the Scriptures of which this word forms a part; as, Nebuchadnezzar, Nebuzaradan, Nebushaszan, etc.

Nebraska, nē-brăs'ka (the «Tree Planter State» (admitted to the Union 1 March 1867), is bounded on the north by South Dakota, on the west by Colorado and Wyoming, on the south by Colorado and Kansas, on the east by Iowa, from which it is separated by the Missouri River. Capital, Lincoln; area, 76,840 square miles; population (1900) 1,066,300.

Topography.— The surface of Nebraska is a part of the great plain which slopes from the Rocky Mountains to the Missouri River. This slope is gradual but almost rapid. The western part of the State is called the foot-hill region, being the extreme extension of the Rocky Mountain uplift. Its eastern elevation is from 3,600 to 4,000 feet, and its western about 5,000 feet. North of the North Platte River a low mountain chain — Pine Ridge — extends east and west about 100 miles, some of its precipitous hills or peaks, of fantastic shapes, reaching a height of 4,500 feet. The part of the Bad Lands in Nebraska is included in this region. The surface slopes from Pine Ridge southward to the North Platte River. There is another chain of low mountain south of the North Platte River, called the Wild Cat Mountains, and in this range Wild Cat Mountain, in Banner County, rises to a height of 5,038 feet, the highest elevation in the State; and Gabe Rock and Big Horn Mountain, in the same county, are respectively 5,006 and 4,718 feet in height. East of the northern foot-hills are the Box Butte plains, with a gently undulating surface, about 500 square miles in area and 4,000 feet in elevation. The surface slopes gradually from north to south also. Thus the altitude at Benkelman, in the extreme southwest, is 2,968 feet; of the extreme southeast, at Rulo, 842 feet; of the extreme northwest, at Harrison, 4,849 feet; of the extreme northeast, at Dakota City, 1,102 feet. The altitude of Kimball, in the southwest part of the western projection of the State and about 100 miles south of Harrison, is 4,697 feet. The uniformity of the slope of the Platte Valley is remarkable. The altitude of Plattsmouth, at the mouth of the Platte River, is 968 feet; of Kearney, in the Platte River Valley, about midway across the State, 2,152 feet; and of Ogallala, near the western border and also in the Platte Valley, 3,211 feet — the difference between Plattsmouth and Kearney being 1,184 feet, and between Kearney and Ogallala 1,159 feet.

River Systems.— The river system is simple and in an undeveloped condition. The only large river, besides the Missouri, which forms the eastern border of the State, is its tributary, the Platte, which flows through the central part from east to west. Both the north fork and the south fork of this river rise in the heart of the Rocky Mountains, the first northwest, and the other southwest of Denver. They unite at the town of North Platte, 250 miles from the east boundary of the State. The other considerable streams are the Republican, the Niobrara, and the Loup Fork rivers. The Republican rises in eastern Colorado, and flows eastward in Nebraska and near its southern line for a distance of 216 miles, then southwestwardly in Kansas, entering the Kansas River at Junction City, Kan. The Niobrara River, whose entire length is about 460 miles, rises in the mountainous districts of southeastern Wyoming, and flowing eastward enters the Missouri River on the northern border of the State, 100 miles from its eastern line. Through about 200 miles of its course it flows rapidly in a deep and narrow cañon, and then in a broad and sandy channel, characteristic of the other principal rivers of Nebraska. The main branch of the Loup Fork rises in the northwest part of the State, and flowing southeastwardly enters the Platte River at Columbus, 75 miles west of the eastern boundary of the State. Notable features of the river system are that the principal streams run nearly parallel to one another, and are almost uniformly shallow, with low banks. In general, the surface of the land slopes away from the Platte River on the south, so that, regarded from that side, its bed is really a ridge rather than a valley. For example, the altitude of the southerly part of Franklin County is 1,845 feet, while that of the river, only 40 miles north, is about 2,150 feet. The sources of the Platte River are mountain streams fed by the snows of the Rocky Mountains. An inexhaustible bed of water underlies the surface of the whole State, and it percolates rapidly through the loose formation, so that wells yield a remarkably large flow. This subterranean sheet of water is fed partly by seepage from the Platte and other principal streams, but mainly by the rainfall, 90 per cent


NEBRASKA
SCALE OF MILES
10 5 0 10 20 30 40 50
Indian Reservation Boundaries
Military Reservation Boundaries
Forest Reserve Boundaries
State Capital
County Seats
Places of 20,000 and over OMAHA
" " 5,000 to 20,000 Fremont
" " 2,000 to 5,000 Blair
" " 1,000 to 2,000 Weeping Water
Hammond's 8 x 11 Map of Nebraska
Copyright, 1904, by C.S. Hammond & Co., N.Y.
SOUTH DAKOTA
COLORADO
KANSAS
IOWA
DAWES
SIOUX
SHERIDAN
BOXBUTTE
CHERRY
KEYA PAHA
BROWN
GRANT
HOOKER
THOMAS
BLAINE
SCOTTS BLUFF
BANNER
CHEYENNE
DEUEL
MCPHERSON
LOGAN
GUS
KIMBALL
PERKINS
LINCOLN
CHASE
FRONTIER
HAYES
DUNDY
HITCHCOCK
RED WILLOW
FURNAS
Longitude 100° West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MINNESOTA
Worthington
Rock Rapids
Sibley
Spirit Lake
Sioux Falls
Lester
Hills
Garretson
Canton
Doon
Sheldon
Hartley
Centerville
Pringhar
Hawarden
Alton
Marcus
Cherokee
Onawa Jc.
Le Mars
Remsen
Merrill
Kingsley
Correctionville
Sioux City
Moville
Sergeant Bluff
Ida Grove
Mapleton
Whiting
Onawa
Ute
Charter Oak
Denison
Blencoe
Arion
Manilla
Logan
Modale
Missouri Valley
Calhoun
Minden
Mondamin
Woodbine
Harlan
Atoca
Omaha
So. Omaha
Plattsmouth
Redoak
Tabor
Nebraska City
Otoe
Hamburg
Auburn
Tecumseh
Johnson
Nemaha
Richardson
Humboldt
Falls City
Pawnee City
Aztell
Iliawatha
Sabetha
Marysville
Goff
Helena
Westmoreland
Valley Falls
Topeka
Kansas River
Manhattan
Junction City
Clay Centre
Miltonvale
Clifton
Concordia
Jamestown
Mankato
Courtland
Washington
Lawrenceburg
Clyde
Hubbell
Burr Oak
Phillipsburg
Smith Centre
Osborne
Deloit
Stockton
Barnard
Lincoln
Minneapolis
Republican
North Fork
South Fork
Solomon
Republican
Beaver
Scandia
Yankton
Missouri River
Vermillion
Elk Point
Jefferson
Akron
Maurice
Big Sioux
Newcastle
Dakota City
Homer
Sioux City
Correctionville
Little Sioux
Ponca
Hartington
Laurel
Wayne
Carroll
Wakefield
Allen
Wisner
Norfolk
Pilger
Stanton
Madison
Westpoint
Beemer
Bancroft
Decatur
Lyons
Oakland
Craig
Tekamah
Herman
Blair
Fremont
Schuyler
Columbus
Colfax
Dodge
Scribner
Snyder
Argo
Crowell
Wayne
Dixon
Cedar
Knox
Bloomfield
Crofton
Center
Creighton
Niobrara
Verdigris
Spencer
Butte
Gregory
Tripp
Scotland
Wheeler
Boyd
Holt
Rock
Keya Paha
Platte
Armour
Parker
Marion
Lennox
Tyndall
Bonesteel
Jamieson
Baker
Ft. Randall
Military Reserve
Basin
Anoka
Gross
Naper
Mills
Paddock
Ancar
Catalpa
Turner
Scottsville
Dukeville
Saratoga
Joy
Slocum
Agee
Inglis
Ray
Atkinson
Walnut
Middleburg
Venus
Page
Emmet
O'Neill
Inman
Greenvalley
Stafford
Inez
Hammond
Sybrant
Duff
Amelia
Chambers
Little
Clearwater
Ewing
Swan
Buffalo
Ballagh
Francis
Newboro
Blake
Erina
Baird
Cumminsville
Elgin
Loup
Garfield
Wheeler
Bartlett
Ericson
Easton
Burwell
Taylor
Sedley
Alta
Elyria
Ord
Geranium
Valley
Greeley
Horace
Arcadia
Scotia
Cotesfield
Fuston
Alpine
Loup
Dannebrog
Farwell
Austin
Sherman
Howard
Dwight
Cushing
Fullerton
Nance
Albion
Boone
Cornlea
Tarnov
Newman Grove
Genoa
Platte Center
Columbus
Duncan
Rochester
Bellwood
Prague
Malmo
Colon
Weston
Tuchy
Ithaca
Wahoo
Saunders
Douglas
Irvington
Papillion
Gretna
Meadow
Sarpy
Glenwood
Hastings
Merrick
Polk
Osceola
Shelby
Bromsburg
Butler
David City
Central City
Hamilton
Aurora
Giltner
Henderson
Grand Island
Buffalo
Kearney
Phelps
Harlan
Franklin
Webster
Nuckolls
Thayer
Red Cloud
Superior
Hebron
Fairbury
Jefferson
Gage
Wymore
Beatrice
Blue
Big Blue
Lincoln
Seward
Milford
Utica
Ruby
Staplehurst
Beaver Crossing
Garland
Pleasant Dale
Bee
Raymond
Malcolm
Havelock
University Place
Lancaster
Crete
Dorchester
Friend
Sutton
Fairmont
Geneva
Saline
Fillmore
Exeter
Milligan
Wilber
Clatonia
Adams
Grafton
Pickrell
Filley
Crab Orchard
Johnson
Auburn
Tecumseh
Nemaha
Brownville
Rulo
Salem
Dawson
Verona
Clay Center
Fairfield
Hastings
Juniata
Heartwell
Kenesaw
Holstein
Hansen
Westmoreland
Upland
Campbell
Bladen
Rosemont
Inavale
Oak
Guide Rock
Republican City
Riverton
Bloomington
Naponee
Oxford
Orleans
Arapahoe
Cambridge
Eldorado
Edison
Oxford
Danbury
Indianola
Culbertson
Hayes Center
Hitchcock
Trenton
Stratton
Benkelman
Dundy
Chase
Perkins
Keith
Lincoln
Frontier
Gosper
Phelps
Kearney
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of which is absorbed by the porous soil; while in the States east of the Missouri River 50 per cent of the rainfall commonly flows over the surface, and is either evaporated or finds it way to the sea. While there are many smaller streams of water in most parts of the State, tributary to the principal streams, yet these are not as numerous as in the more easterly States; but, on the other hand, in Nebraska, an unlimited supply of water, which is easily reached through the loose soil and drawn to the surface by windmills, underlies every farm; and in fact the States of the trans-Missouri plains have the best distributed water supply for ordinary purposes in the country.

Artesian Wells.— Artesian wells, most of them with a strong flow of water, are found in 35 counties, distributed throughout all parts of the State. They may be classed in four natural groups: the deep wells of the Carboniferous, located at Beatrice, Lincoln, and Omaha, and of a depth varying from 556 to 2,463 feet; those of the northeastern counties in the Dakota sandstone, 300 to 600 feet deep, a continuation of the great South Dakota basin, where the water flows with great force from below the Pierre shale when it is pierced; the shallow wells in glacial clays and sands, such as those at Cook; and other shallow wells not in the drift, as in Holt and Rock counties. The water from the artesian wells at Beatrice and Lincoln are very strongly impregnated with common salt, and at the latter place they are extensively used for bathing and medicinal purposes.

Climate and Rainfall.— The atmosphere of Nebraska is characterized by dryness and rarity, though these qualities are not extreme. This feature, together with the generally cloudless sky, makes the climate through most of the year exhilarating and very enjoyable. In the months of July, August, and September, the sun is very hot, and at times the south wind is oppressive; but this is the only disagreeable feature of the climate. The winters, in particular, are dry, and in general mild with prevailing brilliant sunshine. The highest average temperature of 52° F. is found in the extreme southeast part of the State at an elevation of about 900 feet; it is 2° less in the southwest part at an elevation of 3,000 feet. The mean annual temperature decreases toward the north at an average rate of 1° to each 40 miles in the eastern and southern parts, but in the northwest the decrease is less rapid. Along the northern boundary the average temperature is about 46°. January is the coldest month, with a mean temperature of about 27° below the yearly average. In the coldest days of winter the temperature falls to from 10° to 20° below zero, and rarely as low as 30° below zero. In the northwest part of the State, 40° below zero has been recorded twice in the last 28 years. July is the warmest month, with a temperature of about 26° above the yearly mean, and a range of mean temperature from 78° in the southeast to 72° in the northwest. In the hottest days of summer the temperature sometimes exceeds 100°. The last killing frost in spring occurs in the southeast during the last 10 days of April, but it appears gradually later to the northward and westward, occurring near 1 May in most of the agricultural section of the State, while in the highly elevated northwest the season is about two weeks later. Killing frosts come as a rule in the South Platte district during the first week in October, and from 5 to 10 days earlier in the central and northwestern parts of the State. The average length of the season between killing frosts is from 155 to 165 days in the southeast, from 145 to 150 in the northeast, central, and southwest, and from 130 to 135 in the northwest. The precipitation consists almost entirely of rain, the average snowfall being only about 20 inches, equal to two inches of water, or less than one tenth of the total precipitation. The precipitated moisture comes almost entirely from the Gulf of Mexico, and is brought by the prevailing southerly winds of summer. The annual precipitation slightly exceeds 30 inches in the southeastern part of the State, and decreases to the north and west somewhat irregularly but at an average rate of 1 inch from the southeast corner to the middle of the western border, where it is only 15 inches. The decrease northward along the eastern border is about 1 inch for 40 miles, or to 27 inches in the northeast corner. The decrease westward is 1 inch for each 50 miles along the northern border, or to 18 inches in the northwest corner. There is very little precipitation in the winter months, and it averages less than an inch of water for each month from November to February, inclusive. There is a slight increase in March, but the spring rains begin in April, when the fall is from 2 to 3 inches in most parts of the State. In May it is about 1 inch more, and in June and July reaches about the same amount. June is the month of heaviest rainfall, with an average of 5 inches in the southeast and slightly less than 3 inches in the southwest. There is a decided decrease in August, and still less again in September and October. The significant fact of the meteorology of Nebraska is that nearly 70 per cent of the rainfall occurs in the five crop-growing months — from April to August. This is why, with a relatively small annual rainfall, great crops of all the agricultural staples are produced.

Surface, Farming, Stock-raising, and Irrigation.— With the exception of parts of the extreme northwest counties and of what is known as the Sand Hill region, the soil of Nebraska is fertile; within the limits of sufficient rainfall it produces all crops peculiar to the latitude, and outside of that limit it produces the most nutritious grasses. Wherever in the arid region irrigation is supplied, the soil produces heavy crops. This fact is illustrated in the irrigated part of Scott's Bluff County, where the altitude is over 4,000 feet. The Bad Lands system of South Dakota reaches over into northwestern Nebraska, occupying a part of Dawes and Sioux counties. While most of the Bad Lands are worthless, yet even in them there are cañons and pockets with grass and water which make fine pasture for stock. The Sand Hill region comprises upward of 15,000 square miles, extending generally from the 98th meridian to the 102d meridian on the north border of the State. The other two boundary lines extend from the two points in question in irregular courses to the southeast and to the southwest, respectively, until they meet near the southern border of the State. The hills proper are in the northerly part of this region, and are formed of sand which drifts before the wind. They are constantly

changing their position. The winds from a prevailing direction carry the sand from the side of a hill, over its apex, lodging it on the opposite side, and in this way it slowly travels along the general course of the prevailing wind. This Sand Hill region is a great sponge for the absorption of water, which in turn breaks out in numerous springs, lakes, and streams. There are many pockets and valleys in these hills which are occupied by ranches and afford fine pasture and hay for stock, while the soil in a large part of the whole region is both fertile and arable. About 40,000 square miles, somewhat more than half of the State, is adapted to agriculture without irrigation, while the rest of the State is well adapted to grazing. The stock that is raised on the vast pasture lands of the western half is fattened by the abundant crops of corn and hay of the eastern part.

The irrigation system comprises canals aggregating about 2,500 miles in length and covering approximately 1,000,000 acres. Most of the running water in the arid portion of the State that is readily accessible has been utilized for irrigation purposes; but some of the streams, and notably the Niobrara River, which would cover a large area of very fertile lands, have not yet been put to use. If the system of water storage and distribution is established by the Federal government, as now contemplated, the resulting increase in the cultivable area and agricultural products of western Nebraska will be enormous.

Blue stem, grama, drop-seed, and wild wheat grass make up the common "prairie grass" which is general in the eastern third of the State. They continue also to the west, but in shorter form, and buffalo grass takes their place to a considerable extent. These grasses, and particularly the blue stem and grama, constitute the "bunch grass" of the more arid parts of the State, including the Sand Hills. The range of vegetable products is shown in the following table, compiled from careful estimates of the crops of 1903, by Prof. A. E. Davisson, of the School of Agriculture, University of Nebraska:

	Acreage	Total yield Bushels
Winter wheat	1,939,776	32,347,647
Spring wheat	439,612	5,781,788
Corn	5,964,048	205,853,660
Oats	1,958,721	62,229,904
Rye	343,067	5,634,382
Barley	113,717	3,118,240
Irish potatoes	68,472	5,523,757
Broom corn	2,047	Tons—725
Millet	132,370	331,612
Sorghum	128,598	457,478
Alfalfa	238,401	837,704
Timothy	243,696	465,571
Wild hay	1,842,216¾	2,728,907
Clover	54,635	95,612

	Number	Value
Sheep	3,264,659	$88,145,793
Horses and mules	2,223,396	8,893,584
Hogs	809,875	40,493,750
Cattle	328,066	1,148,231

A normal crop of corn produces about 250,000,000 bushels, and of wheat upward of 50,000,000 bushels. The yield of these two great staples will in time greatly exceed these amounts. Winter wheat has been found to be a reliable and prolific crop only within recent years; and it has lately been demonstrated that alfalfa will do well and yield above three tons to the acre, without irrigation, anywhere within the farming area of the State. These two facts or discoveries are of vast importance in estimating the future resources of Nebraska. The total number of farms in 1900 was 121,525; total acreage, 29,911,779. The total value of farms at the present time (1903) is upward of $900,000,000. The value of poultry produced each year is about $4,000,000; of milk, butter, and cheese, about $9,000,000; and of eggs, about $5,000,000. All of the principal fruits are raised successfully, and the production is rapidly increasing. The number of fruit trees was more than trebled between 1890 and 1900. The principal crops are apples, cherries, plums and grapes, but the production of peaches has rapidly increased in the last five years. All of the well-known forest trees of northern latitudes thrive in the eastern half of the State. The bull pine is found in considerable quantities in the high lands of the northwest and tends to spread out on the plains as well as along the streams eastward. Pines and other evergreens are being very successfully propagated in the Sand Hills.

Geology.— Geologically Nebraska is probably the most distinctly agricultural State in the Union; but though its rocks are undisturbed sediment and its geology is apt to be regarded as very simple, yet investigation shows it to be diversified and not without economic importance. The geological strata are so deeply buried that they are not exposed for study. They sag or dip toward the west and are hidden until the Rocky Mountains are reached, thus forming a deeply buried trough. The beds are covered by very distinct loose surface material known as bluff deposit or loess, glacial drift and sand hills. All of the southeastern half of the State is covered by loess, often 100 feet deep. This loess is a sandy loam of glacial origin, of a light yellow color and almost inexhaustible fertility. The northwestern half is largely covered by sand hills formed by the transportation and piling up of the disintegrated Tertiary rock by the wind. This sand hill covering is often 300 feet thick. The limestone of the coal measure or Carboniferous age — the oldest rock in the State — is exposed particularly along the streams in the southeastern counties. Though the carboniferous rock does not yield coal of commercial value yet its limestone produces lime, rubble, riprap, and is used for building, smelting and sugar refining; and this formation yields also flint for ballast and enormous amounts of excellent clay for brick, tile and terra-cotta. West of Lincoln, or about 40 miles from the eastern border, the carboniferous strata dip under the cretaceous rock, sinking to a depth of several thousand feet before coming to the surface again in the mountains. If its great mantle of fertile soil and sand could be lifted, cretaceous clays and shales would predominate over the surface of the State. They actually occur in widely scattered patches along the streams. The Dakota is the best known and most important layer of cretaceous rock, being the great water bearing bed. It is composed largely of rusty sands and beds of clay which appear from the south-central boundary to the northeast corner of the State. Besides producing unlimited quantities of excellent water, including the artesian flow, the Dakota layer furnishes superior clay of all colors for brick, a soft and ocherous stone

THE STATE CAPITOL, LINCOLN, NEBRASKA.

Mail

which is used for building, sand for building purposes and valuable gravel beds. Overlying the Dakota is the Benton cretaceous, in the main a white layer of chalk rock overlying black shale. It is found along the Republican and Niobrara rivers. The chalk rock is very soft when quarried and is easily cut into desired shapes for building for which it is used after it has hardened by exposure to the air. This rock promises to become a valuable industrial resource in the manufacture of hydraulic cement.

The Pierre formation overlies the Benton and covers about two thirds of the State, reaching a thickness of 4,000 to 5,000 feet. It is commonly called Pierre shale and is of no commercial value. Overlying the Pierre shale are the Tertiary beds, divided into a lower clayey layer, 800 to 1,000 feet thick, known as the Bad Lands (Oligocene), and an upper layer, 500 to 600 feet thick, known as the Butte sands (Arikaree Miocene). Where the surface is not too much broken the soil of the Bad Lands is inherently fertile, but in general they are of little commercial value. They contain, however, the most important and valuable geological fossils perhaps in the whole country. Scenically they are imposing to the degree of grandeur and will eventually attract large numbers of tourists.

In many places in the southwestern part of the State a still younger formation rests upon what is known as the magnesia or mortar beds (Ogallala). All other beds are still more recent and consist of unconsolidated materials. The eastern fifth of the State has a thin layer of glacial drift under the layer of loess, and it is composed of clay, gravel, sand, boulders of granite, green-stone, and more especially sink boulders of Sioux quartzite from Sioux Falls, S. D. The youngest deposit in the State is the alluvium along the streams, chiefly valuable on account of its great fertility and because it yields brick of a fair quality where good clays are wanting. Among the mineral resources of the State, either already developed or of probable utility, are ocher, peat, bituminous coal of the carboniferous formation, lignite coal of the cretaceous, diatomaceous earth, natural pumice or volcanic ash in extensive beds, enormous amounts of clay, limestone, sand, gravel, flint and material for the manufacture of hydraulic cement. Other well known and important minerals and metals are found, but not in such quantities and conditions as to be of economic value.

Manufactures.— The total capital engaged in manufacturing in 1900 was $71,982,127; number of wage-earners, 24,461; wages $11,570,688; value of products, $143,990,102. The leading manufacturing industry is slaughtering and meat-packing. The product of the eight packing establishments — situated at South Omaha — was $71,018,339. The output of only one or perhaps two packing centres — Chicago and Kansas City — equals that of South Omaha at the present time. Other leading manufactures are, flour and grist-mill products, $8,100,794; steam railway car shops, $2,624,461; printing and publishing, $2,553,051; butter, cheese and condensed meat, $2,253,893; malt liquors, $1,433,501. There are three beet sugar factories in the State, located respectively at Ames, Grand Island and Norfolk. In 1902 forty-seven counties engaged in beet-raising, the total acreage of 11,193 producing 102,858 tons, the average price being $5.00 per ton. The output of the three factories was 22,890,000 pounds of sugar. Nebraska soil is peculiarly adapted to beet-raising and under experienced cultivation produces an average of 15 tons to the acre. A net profit of from $25 to $35 an acre is commonly realized by the beet grower. The area adapted to beet-raising is so great and the soil so rich that the beet sugar industry, which is still in its infancy in the State, promises to grow to great proportions.

Railroads.— Considering the comparative newness of the State, Nebraska has a remarkably well developed railroad system, consisting of 5,757.92 miles. Four trunk lines traverse the State from east to west — the Chicago & Northwestern system on the north; the Union Pacific through the central part along the Platte river; and the Burlington & Missouri and the Chicago, Rock Island & Pacific through the South Platte section. The Chicago, St. Paul, Minneapolis & Omaha railroad — allied with the Chicago & Northwestern — runs along the eastern border of the State from Omaha to the north line, and the Missouri Pacific runs from Omaha southward along the eastern border with several branch lines into the interior of the South Platte section. Ramifications of the main lines cover the eastern half of the State like a net work, and all parts are well supplied with railway facilities. The principal railway centres are Lincoln and Omaha.

The mileage of the several railway systems in 1903 was as follows:

Burlington & Missouri	2,409.69
Union Pacific	947.40
Chicago, Rock Island & Pacific	245.58
Chicago & Northwestern	1,070.08
Missouri Pacific	356.34
Chicago, St. Paul, Minneapolis & Omaha	271.16
Kansas City & Omaha	193.08
Wilmuth & Sioux Falls	129.16
St. Joe & Grand Island	112.83
Kansas City, Wyandotte & Northwestern	20.10
Atchison, Topeka & Sante Fe	2.50
	5,757.92

Finances.— The total assessed valuation for 1903 was $188,458,379.44; the total tax levy, $1,523,316.38, consisting of the general fund, $1,135,721.69; school fund, $199,136.46; university fund, $188,458.23. The State has no bonded indebtedness. The floating interest-bearing indebtedness was $1,997,671.98, 1 June 1903.

Banks.— In September 1903, there were 127 National Banks with total resources of $44,751,-181.62; capital stock, $6,715,000; deposits, $28,-285,377.27; surplus, $1,656,950; undivided profits, $798,451.33. On 5 Sept. 1893 there were 496 State banks with a capital stock of $8,001,000; 113,829 depositors; total deposits, $37,690,305; surplus fund, $1,427,897; undivided profits, $1,566,284; dividends unpaid, $6,295; total resources, $49,539,593, of which $2,352,638 was cash; and $32,222,257 loans and discounts; total reserve, 36⅓ per cent of the deposits.

Education.— Devotion to the cause of popular education and an efficient system of schools characterize Nebraska as all of the prairie States. The percentage of illiteracy is 2.3 —lower than that of any other state except Iowa, which is the same, Kansas being next lowest. Following are data for the year ending 13 July 1902: There were in the 90 counties, 6,666 school districts; 6,813 school houses; 9,101

teachers were required; 9,629 different teachers were employed at an average monthly wage of $40.44; there were 375,340 children of school age — between 5 and 21 years — total enrolment, 290,543; average daily attendance 185,755; average length of term, 138 days; value of school district property, $10,281,548.36; amount paid for books and supplies $254,123.91; total teachers' wages, $2,828,048.94; total expenditures $4,435,338.45; cost of education per pupil (on enrolment), $15.27; cost of education per pupil (on average attendance) $23.87; total indebtedness $3,241,782.82; graded schools, 465; number of teachers in graded schools, 3,152; number of four year high school graduates, 1,135; number of three year high school graduates 521; private schools 221. The total resources of school districts for the same period were $4,566,333.69. Of this sum more than $3,000,000 was raised by state and school district taxation; the balance was derived from fines and licenses and interest on the permanent school fund. The State University, located at Lincoln — the principal higher educational institution — had a total attendance for the year ending June, 1903, of 2,560; and the total number of instructors, including professors, fellows, scholars and assistants, was 175. The income of the University for the same year was as follows:

From one mill state tax	$188,000
Annual interest on land leases, land sale contracts and investments of permanent endowment fund	50,000
Annual cash appropriations by the United States	40,000
Annual receipts from fees and all other sources	42,500
	$320,500

Under the increased valuation of property by the act of the legislature of 1903 it is expected that the income of the university from the one mill tax will be nearly doubled. The State university and the agricultural college are united or fused under one general management. The former received a land endowment from the general government of 45,426.08 acres and the latter 89,148.60 acres. Of these lands 43,250 acres have been deeded to purchasers, 64,250 acres are under contract of sale and 27,000 acres are under lease contract. By act of the legislature the leased lands, that is, all those remaining unsold, are withdrawn from sale. The agricultural college has a finely developed farm of 320 acres contiguous to the city of Lincoln; the campus on which most of the fifteen buildings are situated is in the heart of the city. The value of the farm, campus, buildings and equipment of the university is approximately $1,250,000. The permanent common school securities aggregate $5,072,223.79; permanent university securities, $101,050.97; agricultural college securities, $224,692.14. The total number of acres of lands acquired by the common schools was 2,795,532.65, of which 541,460.06 acres have been deeded, 340,527.23 acres are under contract for sale, 1,909,138.02 acres are under lease contract, 1,339 acres are vacant, and 3,067.84 acres are unclassified. The total interest-bearing value of the permanent school and university funds is $9,746,451.75; and it is estimated that the present value of the remaining lands under sale and lease contracts would swell this fund to $18,000,000. The State school tax must not be less than one half of one per cent nor more than one and a half per cent on the assessed valuation.

There is one State normal and training school, situated at Peru, in which 550 students were enrolled in 1901 and a second, to be located at Kearney, was provided for by the legislature of 1903. There are about 30 private seminaries, academies and colleges, and about 20 denominational private primary schools. The following give the usual college degrees: Bellevue College (Presbyterian), Bellevue; Cotner University, under the auspices of the Christian Church, at Lincoln; Union College (Seventh Day Adventist), Lincoln; Doane College, Crete (Congregational); Fremont Normal College, Fremont; Grand Island College (Baptist), Grand Island; Hastings College (Presbyterian), Hastings; Creighton University (Roman Catholic), Omaha; Nebraska Wesleyan University (Methodist), Lincoln; Nebraska Normal College, Wayne; York College (United Brethren), York. All of the Christian denominations and the Jewish denomination have organizations in the State. In 1900 the total number of church edifices was 2,315; of communicants, 278,334; of ministers, 1,928. The Roman Catholic denomination leads with 90,515 communicants, then the Methodist Episcopal, with 53,810; the Lutheran, 34,577; the Disciples of Christ, 19,560; Presbyterian, 17,650; Baptist, 16,500; Congregational, 14,601.

Charities.— The charitable and penal institutions are as follows: Nebraska Hospital for the Insane, at Lincoln; Asylum for the Incurable Insane at Hastings; Nebraska Soldiers and Sailors' Home at Grand Island; Soldiers and Sailors' Home, Milford; Home for the Friendless (children), Lincoln; State Industrial School (for boys) at Kearney; Girls Industrial School at Geneva; Nebraska Industrial Home (for women) at Milford; Nebraska Institution for Feeble Minded Youth at Beatrice; Institute for the Deaf and Dumb, at Omaha; Institute for the Blind at Nebraska City; State Penitentiary at Lincoln. The governor, commissioner of public lands and buildings and the state superintendent of public instruction constitute the State Board of Charities and Corrections. This board appoints four advisory secretaries, not more than two of whom shall belong to the same political party; and the board and these secretaries serve without compensation. The board appoints a chief clerk and determines his compensation. The officers and other employees of these institutions are appointed by the governor and so are subject to partisan selection and change with each State administration with the inevitable pernicious results. The approximate number in poor-houses in 1902 was 856, and 400 received partial outside relief. There are at present (November 1903) 273 prisoners in the State penitentiary, of whom 5 are women. The labor of 200 is leased to contractors within the penitentiary yards at 50 cents a day.

State Government.— In 1875 the present constitution of the State succeeded that adopted at the time of its admission. The legislature consists of a Senate of 33 members and a House of 100 members — the maximum number allowed by the constitution. Its sessions are biennial and the pay of members for each session is limited to 60 days. Members of both houses

are elected for two years. The executive department consists of governor, lieutenant-governor, secretary of state, auditor of public accounts, treasurer, superintendent of public instruction, attorney general and commissioner of public lands and buildings, who hold office for two years. There are three judges of the supreme court who hold their office for the term of six years. Owing to the practical difficulty of amending the State constitution other de facto officers have been provided for indirectly by creating various boards who are nominally assistants of the regular state officers. Thus there are at present nine supreme court commissioners who perform the same duties as the regular judges except that they have no power to enter judgments. There was formerly a board of railway commissioners created on the same plan, but it was abolished on the ground of uselessness by the legislature in 1901. There are 15 judicial districts which require 27 judges whose term of office is four years; and a county judge for each county whose term of office is two years. The governor, auditor and treasurer each receive a salary of $2,500 a year, and the secretary of state, attorney general, superintendent of public instruction and commissioner of public lands and buildings, $2,000. The lieutenant governor receives twice the compensation of a senator; and members of both houses of the legislature receive $5.00 a day during the session. Judges of the supreme and district courts each receive a salary of $2,500 a year. These salaries are fixed by the constitution. The several counties may adopt the township system, under which the county board of supervisors is composed of the supervisors from the several townships and municipalities, or the county commissioner system. Under the latter there are three commissioners in counties with not more than 125,000 inhabitants, and five commissioners in all other counties; but counties of not more than 125,000 inhabitants may by popular vote decide to have five commissioners. The term of office of county commissioners is three years. There are six congressional districts in the State.

Politics.— Nebraska was Democratic in politics from the time of its territorial organization under the famous Kansas-Nebraska bill (q.v.) until the latter part of the territorial period when it became Republican through immigration from the strongly Republican States to the eastward and the stimulus of the change to a Republican national administration. The Democrats opposed the admission of the State under the enabling act of 1864, partially to prevent the addition of Republican senators and representatives to the Federal Congress and partially because they believed the financial and political resources of the territory too small to justify or bear the burdens of State government. The Republicans pressed statehood because their leading politicians were ambitious to attain the resulting State and Federal offices and because their party needed additional votes in the Senate in the struggle against the faction led by President Andrew Johnson. Through the impetus and inertia of the issues and passions of the Civil War the State remained decisively Republican until 1890. At about that time the Farmers' Alliance (q.v.), an organization similar to the Granges of other agricultural States, determined to take an active part in politics. In the year named a Democratic governor was elected by a small plurality over the Independent or Farmers' Alliance candidate who in turn received a small number of votes more than the Republican candidate. The Republican candidates for Congress in all three of the districts were defeated by large majorities. This revolution against the Republican party was occasioned partly by revolt against its maladministration of the affairs of the State and partly by a growing anti-monopoly sentiment which insisted on control by the State of the railway corporations, which had never been seriously attempted, and the direct regulation of transportation rates. Even the Democratic governor had vetoed the maximum railway freight bill passed by the Fusionist legislature of 1891. This dereliction of the two old parties was chiefly responsible for the rise and dominant growth of Populism. The independent movement was precipitated at the time in question by the very low prices of farm produce, and rebellion against "ten cent corn" in particular. In the meantime, as a new and easier way of paying old debts grew more desirable, "free silver," as promulgated by W. J. Bryan (q.v.), became the all-powerful Populist shibboleth. In 1894 the Fusion candidate of the Democratic and Peoples' Independent parties was elected governor as also in 1896 and 1898. In 1900 the tide turned and the State has again become Republican by a small majority. A spirit of reprisal against the East for its tariff and other sectional impositions animated the free-silver movement to a greater degree than is generally supposed. The grievances which started the independent movement which overwhelmed Republicanism in Nebraska have been in no wise abated; but democracies do not make hay while the sun shines or prepare for war in times of peace, so that during the period of good crops, and of the good prices which have naturally followed the long period of business depression, Populist reformers have either become Republicans again or are inert, and the cause of reform waits. The Populist movement was at first excited and swift to an almost revolutionary degree, yet this was owing chiefly to the pinching conditions resulting from the accidental coincidence of general industrial depression and several seasons of short crops. Though extravagant in its manifestations, and at the first visionary in some of its objects, the movement was inherently rational and legitimate, and in its political effect salutary.

Population.— The white population was only nominal at the time of the organization of the Territory because it had been set apart as "Indian country," in which white settlement was proscribed. In 1855 the Territorial census showed a population of 4,494, and in 1856, 10,716. In 1860, by the Federal census it was 28,441; in 1870, 122,993; in 1880, 452,402. The peculiar incident of the development of Nebraska is that the railways preceded settlement and improvement, for the double reason that farm produce could not reach the sole far eastern market until the railways should come to carry it, and that the people in general lacked the faith in the productiveness of the country and the courage to test it which were furnished by the strong men at the head of the railway corporations. The total foreign born population in 1900 was 177,347, of which Germany furnished 65,506;

Sweden, 24,693; Bohemia, 16,138; Denmark, 12,531; Ireland, 11,127; England, 9,757; Canada, 8,010; Austria, 3,893; Norway, 2,883; Scotland, 2,773; Switzerland, 2,340; Italy, 752. There were 3,322 Indians and 6,269 negroes. Of the total population 564,592 were males and 501,708 females. In 1900 there were 21 cities with a population of over 2,500. Omaha had 102,555; Lincoln, 40,169; South Omaha, 26,001. The cities next in size are Beatrice, Grand Island, Nebraska City, Fremont, and Hastings, all of these running somewhat above 7,000. No proper comparison can be made of the population of the State and its cities in 1900 with that of 1890 on account of the palpable padding of the census in the latter year.

Following are the names of the 90 counties and their county-seats:

Adams, Hastings.	Jefferson, Fairbury.
Antelope, Neligh.	Johnson, Tecumseh.
Banner, Harrisburg.	Kearney, Minden.
Blaine, Brewster.	Keith, Ogallala.
Boone, Albion.	Keyapaha, Springview.
Box Butte, Alliance.	Kimball, Kimball.
Boyd, Butte.	Knox, Center.
Brown, Ainsworth.	Lancaster, Lincoln.
Buffalo, Kearney.	Lincoln, North Platte.
Burt, Tekamah.	Logan, Gandy.
Butler, David City.	Loup, Taylor.
Cass, Plattsmouth.	Madison, Madison.
Cedar, Hartington.	McPherson, Tryon.
Chase, Imperial.	Merrick, Central City.
Cherry, Valentine.	Nance, Fullerton.
Cheyenne, Sidney.	Nemaha, Auburn.
Clay, Clay Center.	Nuckolls, Nelson.
Colfax, Schuyler.	Otoe, Nebraska City.
Cuming, West Point.	Pawnee, Pawnee City.
Custer, Broken Bow.	Perkins, Grant.
Dakota, Dakota City.	Phelps, Holdrege.
Dawes, Chadron.	Pierce, Pierce.
Dawson, Lexington.	Platte, Columbus.
Deuel, Chappell.	Polk, Osceola.
Dixon, Ponca.	Red Willow, McCook.
Dodge, Fremont.	Richardson, Falls City.
Douglas, Omaha.	Rock, Bassett.
Dundy, Benkelman.	Saline, Wilber.
Fillmore, Geneva.	Sarpy, Papillion.
Franklin, Bloomington.	Saunders, Wahoo.
Frontier, Stockville.	Scott's Bluff, Gering.
Furnas, Beaver City.	Seward, Seward.
Gage, Beatrice.	Sheridan, Rushville.
Garfield, Burwell.	Sherman, Loup City.
Gosper, Elwood.	Sioux, Harrison.
Grant, Hyannis.	Stanton, Stanton.
Greeley, Greeley Center.	Thayer, Hebron.
Hall, Grand Island.	Thomas, Thedford.
Hamilton, Aurora.	Thurston, Pender.
Harlan, Alma.	Valley, Ord.
Hayes, Hayes Center.	Washington, Blair.
Hitchcock, Trenton.	Wayne, Wayne.
Holt, O'Neill.	Webster, Red Cloud.
Hooker, Mullen.	Wheeler, Bartlett.
Howard, Saint Paul.	York, York.

History.— Nebraska, the Indian name of the principal river of the State — commonly known by its French appellation, the Platte — and meaning shallow water, was applied before the organization of the territory to all that portion of the trans-Missouri plains lying approximately between the 38th and the 43d parallels of latitude — or between the watershed of the Platte River on the north and that of the Arkansas on the south. The country to which the name now applies is noted for the Nebraska or Platte Valley route to the Pacific Northwest and the California and Rocky Mountain gold fields over the great Oregon trail, which passed from its southeast border up to and along the Platte Valley; as the initial point of the first trans-continental railroad — the Union Pacific — which also passes along the Platte Valley; as being the subject of the third great compromise of the slavery question known as the Kansas-Nebraska bill (q.v.); as the first territory the acts of whose elective legislature were not required to be submitted to the national Congress for approval; and the only State admitted into the Union on condition of the acceptance by its legislature of a condition imposed by the Federal Congress which undertook to annul a provision of its own constitution.

With the exception of the famous Lewis-Clark expedition, which passed up the Missouri River, making several encampments on Nebraska soil, in 1804, the first explorers and settlers in the State came from Saint Louis, the seat of the western fur trade at the beginning of the 19th century. The Mallet brothers, Frenchmen from Saint Louis, crossed the eastern part of the State as early as 1739, and Colonel Zebulon Pike probably crossed its southern border on his great expedition in 1806. Crooks and McClellan, of Astor's American Fur Company, made the first authentic location on the present site of Bellevue in 1810, but remained less than a year.

Manuel Lisa, a Spaniard, and field manager for the Missouri Fur Company of Saint Louis, established a trading post, called Fort Lisa, about five miles below Council Bluff, where he lived a large part of each year until 1819. He may fairly be regarded as the first bona fide white settler of Nebraska. The military division of Major S. H. Long's famous expedition up the Platte Valley to the Rocky Mountains established the first military post in Nebraska in 1819, at Council Bluff, so named by Lewis and Clark because there they held a council with the Otoe and Missouri Indians. It was located about 25 miles above the present city of Council Bluffs, but on the opposite or Nebraska side of the river. The post was first called Camp Missouri and afterward Fort Atkinson, after General Atkinson, the commander of the troops of Long's expedition, and still later, Fort Calhoun. Long's scientific party camped about five miles below at Engineer Cantonment. Captain Bonneville passed through the State over the Oregon Trail in 1832, and Frémont on his exploring expedition in 1842.

Nebraska was included in Louisiana territory after the division of the Louisiana Purchase in 1804, the lower portion called the territory of Orleans comprising the present State of Louisiana. In 1812 the name was changed to Missouri territory, in 1819 the territory of Arkansas with the present boundaries of the State on the north and south but extending to the western boundary of the Louisiana Purchase, was organized. After the admission of Missouri as a State in 1821 the remainder of the Louisiana Purchase remained without political organization until 28 June 1834, when that part of it north and east of the Missouri River was attached to Michigan. On 30 June 1834 the remaining part of the Purchase was designated as «Indian country» by act of Congress and set apart exclusively for Indian occupancy. There was, therefore, no political organization and little or no white settlement within Nebraska until its territorial organization in 1854.

The politics of the territory at the outset was largely influenced and the official appointments dictated by the Southern pro-slavery element. The first two governors were from Southern States, and many of the other appoint-

ive officers were importations from the same section. The first governor of the Territory, Francis Burt, of South Carolina, took the oath of office at Bellevue, 16 Oct. 1854, and died from the effects of his long journey from South Carolina two days afterward. He was a member of the famous Nullification Convention of 1832 and voted for the resolutions there adopted. Bellevue was the principal settlement or town of the territory and Governor Burt intended to designate it as the capital by convening the first legislature there; but Secretary Thomas B. Cuming, who succeeded him as acting governor, called the first legislature to meet at Omaha 16 Jan. 1855, and that body located the capital there. This action aroused animosity between the North Platte and the South Platte sections of the territory which continued with great bitterness until the capital was finally removed to Lincoln, its present site, by act of the first State legislature, 14 June 1867. The legislature of 1857 passed an act to remove the capital from Omaha but it was defeated by the veto of the governor. The legislature of 1858 divided in a controversy over capital removal, the majority retiring to the village of Florence, and the minority remaining at Omaha, thus precluding any practical work for that session. W. A. Richardson, the chief lieutenant of Stephen A. Douglas in the struggle over the Kansas-Nebraska Bill, was governor of the territory during the year 1858. He resigned the office on account of the rupture between Douglas and President Buchanan over the question of the admission of Kansas as a State. On 5 March 1860, a proposition for the Territory to enter statehood was defeated by a popular vote of 2,094 to 2,372. Under authority of the enabling act of 19 April 1864, which was passed by Congress in response to the petition of the territorial legislature of that year, a constitutional convention was held 4 July 1864; but the proposal of statehood having been defeated at the same election at which the delegates to the convention were chosen (6 June) it adjourned without action by a vote of 37 to 5. Political parties were first formed in 1858, the division being almost wholly on the slavery question. The 6th legislature (1860) voted to abolish slavery in the Territory; but the act was vetoed by Governor Black. A similar act by the 7th legislature (1861) was passed over Governor Black's veto. This procedure was purely tactical, as there were only five or six slaves in the Territory and they were not increasing.

The 11th territorial legislature (1866) submitted a constitution to the people who approved it by the close vote of 3,938 to 3,838 on 2 June 1866, notwithstanding that it restricted the suffrage to white men. But the bill to admit the State into the Union under this constitution which was passed by Congress 27 July 1866, failed to become effective by the refusal of President Johnson to sign it. In January 1867, another bill admitting the State passed both houses of Congress; but ostensibly for the reason that it imposed an improper condition precedent — that it should not be effective until the legislature of the proposed State should declare that there should be no denial of the elective franchise or of any other right to any person by reason of race or color — this bill was vetoed by President Johnson, but it was passed over the veto, and the legislature, convened in special session on 20 February, accepted the condition. A great debate took place in Congress over the question of the constitutionality and expediency of imposing this condition, and many Republicans of national fame opposed it on both grounds. The adoption of the 15th amendment to the Constitution of the United States soon after set aside the issue and prevented a test by the courts of the constitutionality of the condition. David Butler, Republican, was declared elected governor over J. Sterling Morton, Democrat, at the election of 2 June 1866, by the slender majority of 109. The first State legislature, whose members were elected at the same time, convened on the following 4th of July and elected John M. Thayer and Thomas W. Tipton, Republicans, United States Senators over J. Sterling Morton and Andrew J. Poppleton, who were supported by the Democratic members.

Indian Occupancy.— That part of the Territory which was settled immediately after its organization was not relinquished by the Omaha, Missouri and Otoe Indians who occupied it until March 1854, two months before the organic act was passed. The Kansas tribe had ceded their lands in the southeastern part of the Territory in 1825, and the Otoe and Missouri tribes had ceded a strip lying east of that ceded by the Kansas, in 1833. The Pawnees ceded all their lands south of the Platte River in the south central part of what is now the State in 1833. In 1857 the Pawnees ceded the rest of their possessions north of the Platte. In 1861 the Arapaho and Cheyenne tribes ceded their lands lying in the southwest corner of the State, in 1875 the Sioux ceded their lands lying north of the Platte in the western part of the State, and in 1876 the Sioux, Cheyennes and Arapahoes relinquished all claims to the remaining Indian possessions which comprised a strip along the north border of the State, lying mostly west of the 101st meridian. While the Omaha, Otoe, Missouri, and Pawnee Indians were in the main peaceable from the beginning of territorial settlement the other tribes, and especially the Sioux and Cheyennes were warlike, and constant attacks were made upon settlers up to 1868. The depredations of the Indians were especially severe during the Civil War in 1863 and 1864, and again in 1867. There is one Indian reservation in the northeastern part of the State occupied by the Omahas and Winnebagoes, the former numbering about 1,200 and the latter 1,100. All the lands of the reservation have been allotted to the Indians in severalty, and they are all citizens of the State. The tendency of the Omahas is to increase slowly and of the Winnebagoes to decrease. The Federal government maintains a school at the Omaha and Winnebago agency, another at the Santee agency, and a boarding school for Indians at Genoa.

The original Territory of Nebraska, which comprised all of the Louisiana Purchase north of Kansas and west of the Missouri River, was reduced by the organization of the Territory of Colorado 28 Feb. 1861, which took away that portion of the present State of Colorado east of the Rocky Mountains; by the organization of the Territory of Dakota, 2 March 1861, taking away that part of the States of North Dakota and South Dakota lying west of the Missouri River, and by the organization of the Territory of Idaho, — 3 March 1863 — which included the remainder of the Purchase lying west of the Dakotas, leaving Nebraska in its present territorial form with

the exception of the addition, taken from Dakota in 1882, of a strip east of the Keyapaha River and west of the main channel of the Missouri River.

ALBERT WATKINS,
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Nebraska, University of, The, at Lincoln, Neb., was founded by act of the legislature in 1869. Funds for the erection of the first building were provided by the sale of lots in the then new capital city of Lincoln. This first building, now called University Hall, was completed in 1871, the lumber and part of the brick being hauled from the Missouri River in wagons. The college of literature, science and the arts was opened 6 Sept. 1871, with a faculty of five professors and 90 students. The charter act contemplated six colleges, but an amendment in 1877 reduced the number to five, merging the State Agricultural College and the College of Practical Science into the Industrial College. The Board of Regents, originally 12 members, but now 6, constitute the governing body. The University comprises the graduate school (degrees, Master of Arts and Doctor of Philosophy); the College of Literature, Science and the Arts (degree, Bachelor of Arts); the Industrial College (degree, Bachelor of Science), which includes the School of Agriculture, the School of Mechanic Arts, and the School of Domestic Science; the College of Law (degree, Bachelor of Laws); the College of Medicine (degree, Doctor of Medicine); the School of Fine Arts; the School of Music; and the summer session. Each college and school has its faculty, charged with the instruction and the immediate management thereof. Law and medicine are not organized into departments. The other colleges are so organized, having the following departments: agriculture; animal husbandry; animal pathology; astronomy and meteorology; bibliography; botany; agricultural chemistry; general chemistry; education (pedagogy); civil engineering; mechanical engineering; electrical engineering; dairy husbandry; domestic science (household arts); mechanical drawing and machine design; elocution; English language; English literature; entomology and ornithology; forestry; geology (including palæontology and geography); Germanic language and literature; Greek language and literature; Roman language and literature; Romance languages; American history and jurisprudence; European history; horticulture; mathematics; military science and tactics; philosophy; physics; physical education; political economy and sociology; zoology. Nebraska students in the College of Literature, Science and the Arts and in the Industrial College pay no tuition. Non-resident students, also all students in the professional schools and in the schools of fine arts and music, pay small tuition fees. All departments are open to both sexes on equal terms. A tax of one mill per dollar on the assessment roll of the State, together with interest income from land sales and land leases are the chief sources of revenue. The University receives the benefit of the Morrill Acts for the maintenance of instruction in branches relating to agriculture and the mechanic arts, and of the Hatch Act, in aid of agricultural experimentation. The 10 buildings on the city campus, with their class rooms, laboratories, libraries and offices, house all the departments except the school of agriculture, the work of which is done mainly at the University farm, and the College of Medicine, in which the last two years' work is given at Omaha. There are five buildings at the farm. This consists of 320 acres, a little removed from the city campus. Here are located the departments of agriculture, animal husbandry, animal pathology, dairying, and horticulture. About 100 acres are laid out in experiment plats for field crops, fruit and vegetables. Herds of cattle, sheep and swine are owned, being used for experimentation as well as for instruction. Four new buildings were recently erected, an administration building and a physics laboratory on the city campus, a hall of agriculture, a dairy building, shops, and a horticulture laboratory at the farm. The libraries accessible to the students contain about 133,300 volumes, of which 55,000 are in the University library itself. Over 500 periodicals are received, and the University possesses a copious and well chosen museum, which is supplemented in several directions by departmental museums. During 1903 the enrolment at the University was as follows: Graduate School 123; College of Literature, Science and the Arts 1,047; Industrial College 673; College of Law 182; College of Medicine 138; School of Fine Arts 85, School of Music 333; Summer Session 254; grand total 2,835. From this 275 names have to be deducted on account of repetition, leaving an actual total of 2,560. Nearly half of these were women, there being women in each department. The University has 61 professors, 8 associate professors, 14 assistant professors, 17 adjunct professors, 35 instructors and lecturers, and 40 assistants.

E. BENJ. ANDREWS,
Chancellor, University of Nebraska.

Nebraska City, Neb., city, county-seat of Otoe County; on the Missouri River, and on the Missouri P. and the Burlington & M. R. R.R.'s; about 45 miles in direct line east by south of Lincoln, the capital of the State, and 40 miles below Omaha. It is in a fertile agricultural region. It is built on the site of old Fort Kearney (1848) and was laid out in 1855. It was incorporated in 1871 and chartered in 1891. The chief manufacturing establishments are flour and lumber mills, planing mills, a cannery, brick works, breweries, a distillery, starch factory, foundries, machine shops, and cereal mills; employing in all about 2,000 persons. It has large grain elevators, cold storage buildings, lumber yards, stock yards, and packing and provision house. It is the seat of the State Institute for the Blind and the Academy of the Annunciation. It has a public library, a government building, city and county buildings, a number of churches, a high school, and public and parish elementary schools.

The government is administered under the charter of 1891, which provides for a mayor, elected biennially, and a council of eight members, one half of whom are elected by wards and the other four at large. Pop. (1890) 11,941; (1900) 7,380.

C. M. HUBNER,
Editor 'Nebraska City News.'

Nebraska River. See PLATTE.

Nebraska Wesleyan University, The, is located at University Place, four miles from the capital city of Nebraska, has its own municipal government, and is connected with the city

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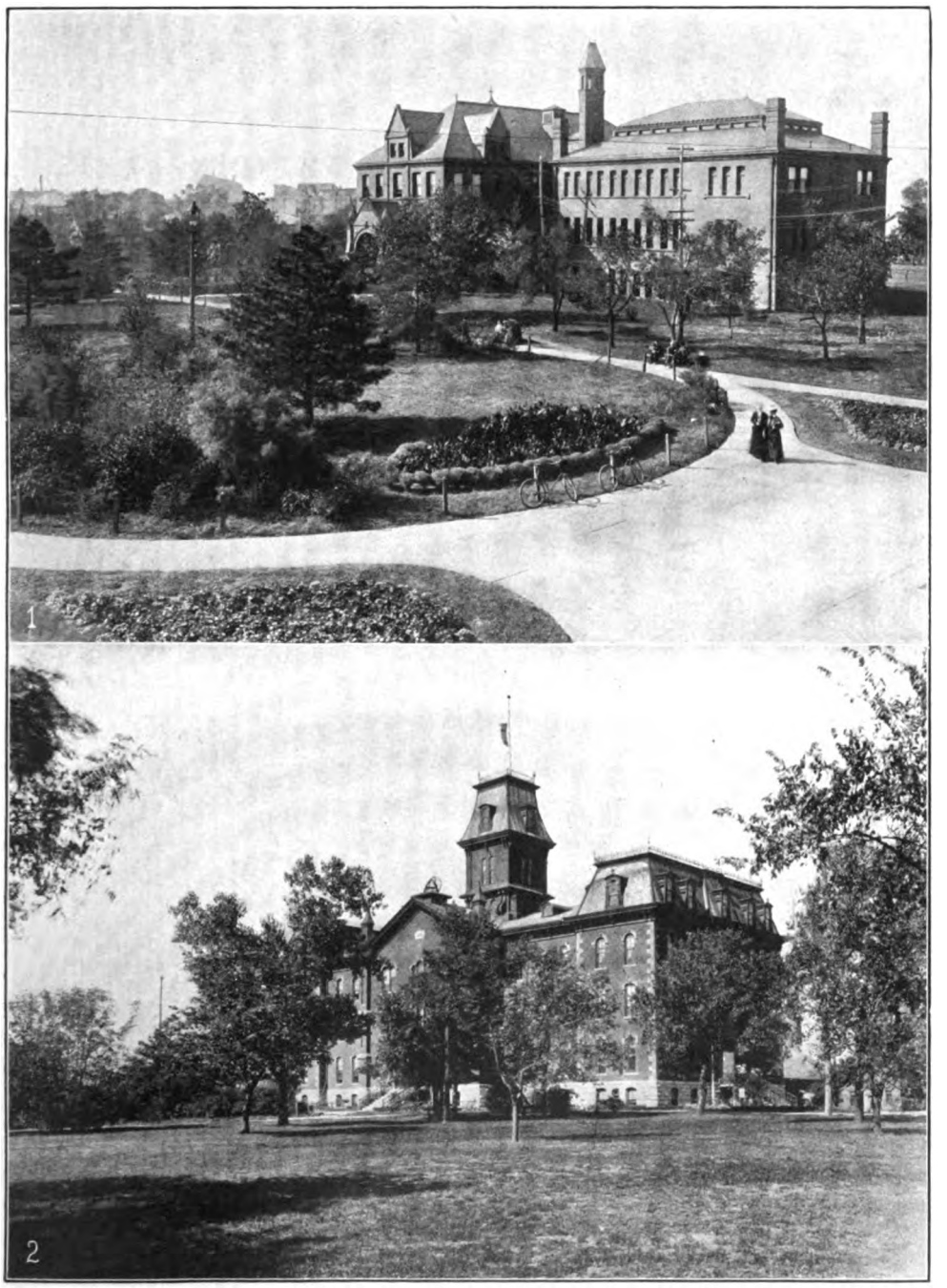
LINCOLN.



1. Main Building, University of Nebraska. 2. Library, University of Nebraska.

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of Lincoln by lines of electric railway. The University is a denominational institution of the Methodist Episcopal Church, organized in 1887 as the result of an effort to unify the educational interests of the denomination within the State. It consists of a College of Liberal Arts, an Academy with courses fitted to the college curriculum, a Normal School, a School of Expression, and a Conservatory of Music. It is coeducational, and its standards for degrees are those required by the college senate of the denomination for its first class institutions. Its first graduates were the class of 1890, which consisted of four members. Its present number of students is 700; its professors and instructors 40. Its college graduates number about 250; its library has 5,000 volumes; its buildings and grounds are valued at $150,000; its productive endowment is $50,000. Its present chancellor is DeWitt C. Huntington, D.D.

Nebuchadnezzar, nĕb″ü-kạd-nĕz′ạr (Nabu-Kudurriuzur, "Nebo protect my dominion"), the most illustrious monarch of the New Babylonian or Chaldæan kingdom, son of Nabopolassar (q.v.). In the life-time of his father he defeated as crown prince the Egyptian Pharaoh Necho at Carchemish 605 B.C., and ascended the throne as his father's successor 604 B.C. He at once began his career of conquest, subduing Syria, and laying Judah and its king, Jehoiakim, under tribute. In 598 he marched against Jerusalem and led away into captivity at Babylon Jehoiakin, the 18-year-old son of Jehoiakim, just as he had succeeded to the throne on his father's death. With the young king the most eminent rulers of the land were carried off, 10,023 in all, together with the costly spoils of the temple and royal palace. As Zedekiah who succeeded Jehoiakin in the latter's exile entered into a treaty with Egypt Nebuchadnezzar's army besieged and captured Jerusalem a second time, carrying off Zedekiah into captivity (586 B.C.). Nebuchadnezzar meanwhile had strongly established his headquarters at Ribla in Cœlo-Syria. The remaining inhabitants of Jerusalem were taken as captives to Babylon, and the Jewish capital absolutely destroyed. For the 13 years between 585 and 573 B.C., the city of Tyre was besieged by Nebuchadnezzar to no purpose; in 572 B.C. he invaded Egypt and conquered it from Syene to the frontiers of Ethiopia. Pharaoh Hophra was defeated and dethroned and from 565 to 586 B.C. a Babylonian army occupied Egypt. Besides his activity in these campaigns Nebuchadnezzar was tireless in efforts for the security of his realm, the welfare of his people, the adorning and fortification of his capital Babylon. He restored the ruined canal and cut another, the King's Canal. At Sippara he made a lake like Lake Mœris, ten miles in circumference, which received and distributed the overflowing waters of the Euphrates, and he founded the city of Teredon at the mouth of that river. He built the Median wall as a defense to his kingdom, and completed the vast ramparts which his father Nabopolassar had begun. He beautified the royal residence with palace and temple buildings, finished the tower of the seven planets at Borsippa, restored and decorated the royal palace of his father, and built a new palace on a height surrounded by hanging gardens for the pleasure of his Median wife Amytis. This great work is said to have been completed in 15 days. He died after a reign of 43 years, 561 B.C., deeply deplored by his subjects.

Neb'ula (in medicine). See LEUCOMA.

Nebulæ, The, in astronomy, a term derived from the Latin, signifying little clouds. The nebulæ may properly be divided into two distinct classes, the green and the white. Less than five per cent of the number in the catalogues make up the former class, but this disproportion is made up for in area by their greater size in many cases. The difference between the two classes is fundamental, and it is questionable even if they might not properly be designated by different names. The spectrum of the green nebulæ consists chiefly of green and blue lines with sometimes a very faint continuous spectrum,— their constitution is therefore obviously mainly gaseous. The spectrum of the white nebulæ is continuous, with, in one instance, evidence of very faintly marked bright and dark lines. Their nature is therefore uncertain, but probably they are made up largely of solid as well as gaseous matter. From their small proper motions it is not likely that any of the nebulæ are as near us as the nearer stars. The green nebulæ are distributed in and near the Milky Way; the white ones are located on either side, and are generally remote from it. In this respect they differ from the star clusters, which in other respects they somewhat resemble. While the Milky Way shines chiefly by the light of the countless stars that it contains, a portion of its light is also due to enormous areas of green nebulous matter, which serves as a luminous background to the stars themselves. Undoubtedly the finest telescopic object in the sidereal heavens is the great nebula in Orion, which belongs to this class. Its extension in a gigantic spiral fills a large part of the constellation, and is the largest nebula known outside of the Milky Way. Next to it in size and also in magnificence is 30 Doradus, in the larger Magellanic Cloud. This is also a spiral structure. The Argus and Trifid nebulæ are other fine specimens of this class. All these nebulæ are obviously connected with a large number of stars, and are possibly in process of dispersion from them. Frequently a single star will be connected with a nebular wisp. These objects are known as nebulous stars, and are evidently analogous to the larger formations.

There is a second division of the green nebulæ. These have the same spectrum, but owing to a slightly different division of the light usually present a somewhat bluish appearance. These are known as planetary nebulæ on account of their rounded well defined disks. The disks are generally somewhat diversified and contain sometimes one and sometimes two stellar nuclei. The largest and finest of the planetary nebulæ is known as the Owl nebula in Ursa major. It is so called because it was formerly supposed to resemble the face of an owl. For a few years it had two brilliant nuclei which corresponded with the two eyes. Later, first one and then the other of these disappeared, and now it has a single nucleus in its exact centre. If the planetary disk is too small to be distinguished as such, the formation is designated as a stellar nebulæ. When a *nova* or temporary star fades out, it is usually

converted into one of these bodies. If the central portion of a planetary nebula is comparatively dark, it is then called a ring nebula. The best known example of this class is the ring nebula in Lyra.

Practically all the large white nebulæ exhibit a spiral structure, but they differ from the green spirals in that they are double instead of single. This can best be understood if we imagine a pliable rod which we take hold of at one end and roll up into a single spiral like a clock spring. If we take the rod by the middle and twirl it as we might a cane, we shall have a double spiral, and indeed it looks as if it were by such a whirling action that spiral white nebulæ were constructed.

The largest and most brilliant white nebula in the heavens is the great nebula in Andromeda. It is the only nebula indeed that is conspicuous to the naked eye. The one best showing its spiral nature, however, is the Whirlpool nebula in Canes Venatici. Often, as is the case with both of these objects, a secondary nucleus terminates one of the spirals. Smaller nuclei frequently occur at intermediate positions upon both spirals. If the nebular hypothesis is correct, and the solar system condensed from a former large nebulous mass, it is likely to have been from an object such as one of these, only probably on a much smaller scale. Unlike the green nebulæ, the white ones are not associated with brilliant stars, but that they are sometimes connected with small ones is shown by the fact that in 1885 a small temporary star suddenly appeared close to the centre of the nucleus of the great nebula in Andromeda. While we have little evidence bearing upon the subject, it seems most likely that the white nebulæ are condensing at present upon numerous hot stellar nuclei located in their midst. What the size of these nuclei may be we have no knowledge, but it seems likely that they are generally small as compared to our sun.

A subdivision of the white nebulæ, containing by far the largest part of them consists of small faint elliptical bodies showing no detail. It is possible that if they were nearer to us, and were better seen, that they, too, would show a spiral structure. In closing this brief summary of our knowledge of the nebulæ, we must refer to one most unexpected property that some of them have exhibited — that of variability. Three variable nebulæ have appeared and disappeared in the constellation Taurus, but the best known example is that of the Trifid nebula, a large section of which, which was formerly dark, is now bright, and apparently a region which was formerly bright is now dark. This is probably due not to a shifting of the material itself, but to a change in its luminosity. The source of this luminosity is now generally believed to be electric, although it may be suggested that the unknown gas which all the green nebulæ contain in combination with hydrogen, and which is found nowhere else in the universe, may possess properties like radium, rendering the whole gaseous formation luminous until its original atomic structure is finally broken down.

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Nebular Hypothesis, The. This term in astronomy has come to signify that process of formation of the solar system which was propounded first by Swedenborg, next by Kant, and finally by LaPlace. It is generally associated with the name LaPlace. Occasionally it is spoken of as Kant's hypothesis, but Swedenborg's name is seldom associated with it. According to this hypothesis in its modern form, the sun and its attendant planets and satellites originally existed as one vast gaseous mass of greater diameter than the orbit of Neptune. This mass contained also numberless small solid particles. Owing to gravitation it gradually condensed. By the principle of the conservation of energy, as the mass became smaller its temperature must necessarily have risen. At the same time by the relative action of the various currents existing in the original mass of gas a continuous rotation in one direction would have been set up. As it shrank in size, by the principle of the conservation of momentum, its velocity of rotation must necessarily have increased. Under these circumstances, as it continued to grow smaller and hotter, a portion of its substance, owing to centrifugal force, must sooner or later have been left behind, to revolve about it in a closed orbit.

If the structure of the outer portions was very uniform, a considerable mass of matter might be left at one time. If this were sufficiently large it would form a ring about the central body, like that which we now find surrounding the planet Saturn. If not sufficiently large, the bodies into which it would condense would revolve independently, like the belt of asteroids now surrounding the sun. If the outer portions of the original nebula were of irregular structure, an independent nebulous mass would be left behind. If this were small, it would condense into a comet, which is merely a cloud of meteors and gas resembling the original nebula, but if it were large enough to exert an appreciable gravitational effect of itself, it might condense into a separate star or planet.

It was originally supposed that a ring was always formed preparatory to condensation into a planet. This does not, however, seem necessary, and the whole nebulous mass may possibly have had a spiral structure with condensations occurring at intervals along its length, such as we see at present on a large scale in the great nebula in Andromeda and in Canes Venatici. Certain it is that nebulæ of this type are extremely common in the heavens, while ringed structures like the nebulæ in Lyra and Hydra are more rare. The process of contraction of the central mass of what was originally our nebula is still going on, and is indeed the source of the sun's heat at the present time. In order to produce the actual enormous output of solar energy, the sun's diameter must diminish at the rate of about 300 feet a year, a quantity too small for us to measure, however, even after the lapse of several centuries.

Two objections to the nebular hypothesis have been raised of late years. If the satellites are formed by the condensation of the mass of the planets, then when the planets shrink away from them, the satellites should revolve in their

orbits more slowly than the planets revolve on their axes. This is true of all the satellites save the innermost one of Mars, which makes rather more than three revolutions while the planet makes one. The generally accepted explanation of this anomaly is a slight retardation of the time of rotation of the planet due to a tide formally raised upon it by the sun. If the planet revolves more slowly than the satellites, than by tidal interaction between them, the velocity of the satellites will be increased, and at the same time the two will be drawn nearer together. Should these conditions continue, the satellites would ultimately fall upon the surface of the planet. Another suggestion is that the two satellites of Mars are asteroids captured by the planet at a time when the eccentricity of its orbit was much higher than it is at present. The second objection to the nebular hypothesis is a more serious one. If the planets originally had the form of rings, then by Kepler's third law the inner edge of the ring would have revolved faster than the outer one. When the ring was condensed to form a planet, the planet and its satellites would then have revolved in a retrograde direction. With the exception of Uranus and Neptune all the planets revolve direct, that is in the same direction as the sun.

To overcome this difficulty LaPlace suggested that the rings, owing to friction among their particles, revolved as one piece. This we now know could not have been the case. Kirkwood proposed that although the planets started with a retrograde rotation, yet if in a greatly diffused condition, tidal friction would soon cause them to present always the same face to the sun. This would be tantamount to a direct rotation, and subsequent condensation might accelerate the acquired velocity up to the present observed rate of speed. Faye suggested the idea that all the inner planets were formed inside of the nebula and before it had become much condensed; that Uranus and Neptune were formed later after the central condensation had occurred; and that this would account for the difference in the direction of the rotation. Trowbridge has pointed out that if the rings were much denser near their inner edge in the case of the inner planets that this would explain their direct rotation. Of course if the planets separated from the central mass as individual bodies, not as rings, they would then all have a direct rotation. There are two objections to all these suggestions. One is that they explain the rotation of Neptune in a different manner from that of the other planets, and the other is that they do not explain the rotation of Uranus at all. This planet, or rather its satellites, and therefore probably the planet itself, revolves in a plane very nearly at right angles to the plane of its orbit.

It was suggested by the writer (consult 'Astronomical Journal' 1901, No. 511) that although the planets were condensed from the rings or spirals of the nebula they would all undoubtedly revolve in a retrograde direction, yet the tidal action of the sun acting upon them would always tend to set up a rotation in the contrary direction. Now the effect of this would be, not as Kirkwood supposed, to neutralize the original retrograde rotation, by any means, but rather to cause the planet to gradually shift the plane of its rotation, as may readily be demonstrated from the theory of the gyroscope. In its earlier stages, or if the tidal force were small, the direction of the rotation would be retrograde. Later the plane of rotation would so change as to be perpendicular to the plane of the planet's orbit, and still later the plane of rotation would be completely reversed, the planet now having simply a direct rotation.

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Necessita'rian, a name given any one who follows the philosophy or doctrine of necessity. Hobbes may be considered the founder of the English Necessitarians, and on the Continent it was developed by his contemporary Spinoza, and later by Leibnitz. Jonathan Edwards (1703–58), president of Princeton College, toward the close of his life published 'An Inquiry into the Freedom of the Will'; and Priestley (1733–1804) published his 'Doctrine of Philosophical Necessity Illustrated' in 1777.

Necessity, Fort, a former defensive work near Union, Fayette County, Pa.; built by Gen. Washington in 1754.

Neches, nĕch'ĕz, a river in Texas, which has its rise in Van Zandt County and flows southeast into Sabine Lake (q.v.). It traverses a fertile agricultural section of the State, and in its lower course passes through an oil region. Beaumont (q.v.) is on its bank a short distance from the mouth. The Neches is about 350 miles long.

Necho, nē'kō, or **Nekau,** Egyptian king, the Pharaoh-Nechoh of the Bible: b. last half of 7th century B.C.; d. 595 B.C. He was son of Psammetichus I., succeeded him in 609, attempted to hold Syria after the collapse of the Assyrian empire, and in this campaign killed at the battle of Megiddo King Josiah of Judah, whose son Jehoahaz was made king dependent on Necho. But the later campaign was less fortunate for the Egyptian king, who was defeated at Carchemish in 604 by Nebuchadnezzar, and thus lost possession of Syria. Necho's internal rule was vigorous; he built a canal from the Nile to the Red Sea and sent out Phœnician sailors to explore the African coast. This fleet is said to have circumnavigated the continent. Consult Budge, 'History of Egypt' (1902).

Neck, that part of the body in the higher animals which forms the juncture of the head with the trunk. In man the neck is formed mainly of the muscles passing from the skull to the thorax, and of the trachea and the œsophagus. There are also the cervical or neck vertebræ, in man numbering seven, the same number being nearly constant in all the *Mammalia.* The most notable exceptions are seen in the manatees and the two-toed sloth, having six neck-vertebræ; while in the three-toed sloth nine cervical segments exist. In long-necked birds as many as 25 cervical vertebræ may be present. In fishes no neck or cervical region is distinguishable. The ligamentous structures connected with the head and neck, and with the articulation of the skull upon the vertebral column, form a very complicated series; and in the lower animals especially — as in the horse or

elephant — there is a strong band of fibres, forming the ligamentum nuchæ, which suspends the head on the neck. In man, the head being balanced on the spinal column, this ligament is of comparatively small size, and it extends from the occipital protuberance at the back of the skull to the spine of the seventh or last cervical vertebra. The muscles of the neck are numerous, and are generally classified and described along with those of the head. The term neck is also used in anatomy to indicate any attenuated process or part of a bone which serves to unite or support parts of larger proportions; for example, the neck of the femur or thigh-bone, the neck of the humerus, of the radius, etc. See ANATOMY.

Neckar, nĕk'kär, Germany, an affluent of the Rhine, which rises in the Black Forest in Würtemberg, near one of the sources of the Danube, and flows through Baden into the Rhine at Mannheim, after a course, including windings, of about 240 miles. The area of its basin is 4,150 square miles. It is navigable for small boats from Heidelberg near its mouth, so far as Cannstadt, but the actual navigation of the river extends only to Heilbronn, up to which steamers ply.

Necker, Jacques, zhäk nā-kār (English, nĕk'ĕr), French minister of finance: b. Geneva, Switzerland, 30 Sept. 1732; d. Coppet, near Geneva, 9 April 1804. In 1750 he went to Paris to enter the banking-house of his uncle, M. Vernet, and having become partner in a banking business, soon acquired an immense fortune. After giving up his business he held the post of resident minister at Paris, representing his native town. Ambitious of literary distinction, he produced his 'Eloge de Colbert' (1773), which gained the prize of the French Academy. His 'Essai sur la Legislation et le Commerce des Grains' (1775) was violently attacked by the economists, owing to his expressing himself in favor of restrictions on the exportation of corn. In July 1777 he obtained the post of director-general of finances. Malversation, under the preceding reign, had caused a great deficit, to which the American war made additions. New taxes would have been unpopular, and Necker endeavored to meet the exigency by loans and reforms. But the partisans of Turgot found fault with his innovations. In 1781 he published his 'Compte rendu au Roi,' relative to his administration. This statement of the financial condition of the nation found favor with the people; but displeased the court, and Necker was dismissed in May 1781. He went to Switzerland, where he published his work 'Administration des Finances' (1784). The errors and prodigality of Calonne, who next had the management of the state finances, increased Necker's reputation: the latter returned to France in 1787, wrote against Calonne, who had accused him of being the author of the deficit, and was exiled in consequence. But in 1788 Necker was recalled as comptroller-general, he supported the convocation of the States-General, which was the wish of the nation, and the giving a double representation to the *tiers état.* When the court in a royal sitting, held on 23 June 1789, wished to annul the decision of the Third Estate, by which the National Assembly was constituted, Necker refused to appear in the sitting. On 11 July the advisers of the king succeeded in inducing him to give Necker his dismissal, and to order him to leave the kingdom. No sooner was his removal known than all Paris was in a ferment. The storming of the Bastille followed (14 July), and symptoms of popular violence became so alarming that the king found himself compelled to recall the banished minister. His first object was to restore tranquillity, and security of person and property. But as minister of finance he was obliged to propose measures unacceptable to the populace. His moderate opinions in regard to the administration of government did not keep pace with the wishes of those who dictated to the people. Under these circumstances he wrote to the Assembly, in September 1790, requesting his dismissal. His daughter, Madame de Staël, has given a somewhat too favorable view of his character as a statesman in her 'Considerations.' His ability, though considerable, was much overrated in his day. Among his other works are: 'De l'Importance des Opinions Religieuses' (1788); 'Réflexions présentées à la Nation Française' (1792); 'Du Pouvoir Exécutif dans les Grands Etats' (1792); 'De la Révolution Française' (1796); and 'Dernières Vues de Politique et de Finances' (1802). A collective edition of his works was published at Paris in 1820–2. Consult Nourrisson, 'Trois Révolutionaires: Turgot, Necker, et Bailly' (2d ed. 1886); Hermann, 'Zur Geschichte der Familie Necker' (1886).

Necker, Susanne Curchod de Nasse, French matron: b. Geneva, Switzerland, 1739; d. Coppet, Switzerland, 1794. She came of a French Protestant family and as a girl was noted for her beauty, wit, and wide knowledge which so attracted the historian Gibbon that he wished to marry her. In 1764 she married Jacques Necker (q.v.) and in Paris her house soon became frequented by the most distinguished men of the day, among them Buffon, Saint Lambert, and Marmontel. She educated her daughter, the famous Madame de Staël in this atmosphere and devoted much time to philanthropic work, founding the hospital named for her. She wrote: 'Reflexions sur le Divorce' (1794), and 'Mélanges' (published posthumously in 5 vols.). See D'Haussonville, 'Le Salon de Madame Necker' (1882).

Necker de Saussure, dĕ sō-sür, **Adrienne Albertine,** French author: b. Geneva, Switzerland, 1765; d. 1841. She was married to Jacques Necker, a cousin of Madame de Staël with whom she was intimate. She published: 'Notice of the Character of Madame de Staël' (1820); and 'Progressive Education' (2 vols. 1828–32).

Nec'romancer, The. See RAMIREZ, IGNACIO.

Nec'romancy (Greek *nekros,* dead, and *manteia,* divination), the divination of the future by questioning the dead, under the belief that the spirits or souls of the dead could be communicated with, and could give information regarding the future. This, like many superstitious rites, it is supposed, is of the highest antiquity. Mention is made of necromancy in the Old Testament: for instance, in Deuteronomy (xviii. 11), where it is forbidden. In the 28th chapter of the first book of Samuel the

witch of Endor is related to have raised up Samuel to gratify the desire of Saul. In many parts of Greece there were oracles of the dead, and necromany was practised in the temples by priests or other religious persons. It was also practised in Thessaly, notorious for magic and sorcery. From the first the practice was condemned by the Christian Church, and during the Middle Ages necromancers were persecuted in all ways, imprisoned, tortured, burned. See also MAGIC.

Nec'ronite (Greek, "a corpse"), a variety of feldspar occurring in granular limestone near Baltimore, Md. It is nearly white in color, and derives its name from the fact that it emits a fetid odor when struck.

Necrop'olis (Greek, "the city of the dead"), a term applied to the cemeteries in the vicinity of ancient cities. In classical antiquity the name is given to a suburb of Alexandria, where the corpses were received and embalmed. Here Cleopatra applied the asp to her breast.

Necro'sis (Greek, literally, "a state of death"), in pathology, the death of a circumscribed piece of tissue. In surgery, the term is specifically applied to the death of a bone, in part or in whole, but especially in mass. The part affected by necrosis, like a slough of the soft tissues, has no longer any organic connection with the body. This dead portion, especially when detached from the bone to which it belonged, is called the sequestrum. If the necrosis is confined to the superficial layers of the bone-substance, the operation of nature by which the dead layers are thrown off is called exfoliation. The line of demarcation is the boundary between the living tissue and the dead. If it is the whole of the outer case of the bone that suffers, the periosteum or investing membrane sometimes remains healthy, and deposits a lymph which rapidly ossifies and surrounds the diseased part with a healthy crust. The bones that most usually suffer from necrosis are those of the lower extremity, the tibia and femur; necrosis of the soft parts is called gangrene (q.v.).

Nectanebo I., nĕk-tā-nē'bō, king of Egypt: d. 364 B.C. The first king of the 30th dynasty he came to the throne in 382, formed an alliance with Evagoras of Cyprus against the Persians; successfully met a Persian invasion in 374; was conservative in religion and restored many old temples. The British Museum possesses his sarcophagus. This great general was succeeded by Teher or Taho, who was supplanted by NECTANEBO II. in 361, also a general and also an ally of the Greeks, with whose help he put down a pretender to the throne and for a time held the Persians off, only to succumb to them (343) after the defection of Mentor, one of his Greek generals. He left Egypt and fled to Ethiopia — or by a late and untrustworthy tradition to Macedonia where he seduced Queen Olympias and thus was the father of Alexander the Great. This story is evidently suggested by a longing for poetic justice to the king defeated by the Persians, who in turn were crushed by Alexander. Egypt was a Persian province from 343 to 332, when it came into the control of Macedonia.

Nec'tar, a sweet liquid secreted by a glandular surface structure in a plant called a *nectary;* and the name is extended by botanists to any aborted part of a flower in the place between the gynœcium and andrœcium (see FLOWER) where nectaries usually occur. Nectar varies in composition with the plant that produces it, but consists mainly of water, with sugar and grape-sugar, and various carbo-hydrates and proteids which make it nutritious and give it flavor and odor. Nectaries may occur in many places, and are of various forms. Those outside of flowers are most often found at or near the base of the petiole, or about stipules. Within flowers the nectar glands form a more or less continuous ring between the stamens and pistil; or the disk itself may secrete a sweetish fluid; or other parts, as the petals (for example, in aconite) may become nectaries. In many cases the secretion exudes directly from the surface and not from any definite pore or excretory opening.

Such structures belong mainly to seed-producing plants and serve the purpose of attracting insects whose visits are beneficial in effecting cross-pollination (see FLOWERS AND INSECTS) as they go from flower to flower in search of this delectable food, which bees, wasps, and others transform into honey. The nectaries on the outside of certain plants attract ants (q.v.) which protect the plant.

The terms nectar and nectary are derived from the name given by the Greek poets to the drink of the immortal gods on Mount Olympus. It was poured out by Hebe, the goddess of Youth, and conferred immortality. Homer describes it as resembling red wine. It was joined with ambrosia, the immortalizing food of the gods, and like it was of most delicious odor.

Nec'tarine, a smooth-skinned peach formerly regarded as a distinct species, which may be derived from the seed of a peach or from a peach bud by bud variation, and which, conversely, may produce a tree bearing peaches by either of the means mentioned. In all ways as an orchard fruit the nectarine is managed like the peach, but is far less popular. Commercial orchards of this tree are planted in California, the product being mainly dried or canned. Consult: Darwin, 'Animals and Plants under Domestication' (1868). See PEACH.

Nedjed, nĕd'jĕd, **Nejd,** or **Nejed,** Arabia, the general name signifying "elevated country," applied to the central Wahabi kingdom in great part covered by the heights of Jebel Toweyk. The capital is Riad (pop. 30,000), a centre of Mohammedan orthodoxy and fanaticism. A great part of the region is sandy desert interspersed with fertile spots inhabited by Bedouins. The more elevated districts with towns and villages inhabited by the settled population, feed immense droves of camels and the best breeds of Arab horses. The climate is healthful. Consult: Palgrave, 'Central and Eastern Arabia' (1865).

Needell', MRS. **John Hodder.** See NEEDELL, MARY ANNA LUPTON.

Needell, Mary Anna Lupton, English novelist: b. London 1830. She was a writer and student in early life and was then married to J. H. Needell of Allington, Dorsetshire. During her married life she suspended writing, but resumed it in 1881. Among her works are 'Ada

Gresham' (1851); 'Catharine Irving' (1853); 'Julian Karslake's Secret' (1881); 'The Story of Philip Methuen' (1886); 'Stephen Elliott's Daughter' (1891); 'Passing the Love of Woman' (1892); 'Unstable as Water' (1902). Several of these have been republished in this country.

Needfire. See FIRE.

Needham, nēd'am, **Charles Willis,** American college president: b. Castile, N. Y., 30 Sept. 1848. He was graduated from the Albany Law School and in 1874–90 practised law in Chicago where he assisted in founding the University of Chicago. In 1890 he removed to Washington where he has established a law practice and since 1897 has been connected with Columbian University of which he became president in 1902.

Needham, James George, American entomologist: b. Virginia, Ill., 18 March 1868. He was graduated in 1891 from Knox College, Galesburg, Ill., and from Johns Hopkins in 1893. He became professor of biology at Lake Forest University in 1898 and has had charge of the New York Entomological Field Station since its establishment in 1899. He has written 'Elementary Lessons in Geology' (1895); 'Outdoor Studies' (1898); etc.

Needham, John Turberville, English naturalist: b. London, England, 10 Sept. 1713; d. Brussels, Belgium, 30 Dec. 1781. He was a Roman Catholic priest and was in his later years director of the Academy of Sciences at Brussels. He published: 'New Microscopical Discoveries' (1745); 'Idée sommaire, ou Vue Générale du Système physique et métaphysique sur la Génération' (1780); etc.

Needle, a small steel instrument, sharp pointed at one end, and having an eye or hole through which is passed a thread in sewing and stitching. Needles were known to the ancients, who ascribed the invention of them to the goddess Bellona; but at first they consisted only of small spikes of wood or fish-bones. The Phrygians and Babylonians must have been acquainted with needles, as they were celebrated for their skill in embroidery. Needle-makers were incorporated at Nuremberg in 1370, and at Augsburg in 1406. The first needle-work in England is said to have been established in 1560.

There are about 22 processes in the present manufacture of needles. The first is the cutting of the coils of wire into two-needle lengths by a guillotine shearing machine. The wire is of the best crucible steel, and requires to be very carefully gauged to size. After being cut, the lengths of wire are raised to a dull red heat and placed in loose bundles inside iron rings to be straightened by rolling each bundle backward and forward on a face plate with a slightly curved bar, through which the rings project. The wires are next pointed at both ends. An arrangement is used by which the wires are withdrawn — one closely following another — from a hopper by a pulley revolving at right angles to the grindstone, the wires being held to the face of the pulley by an india-rubber band. In their passage between the pulley and the grindstone the wires (double-needle blanks) revolve on their axis and become pointed at one end, and the process is repeated for the pointing at the other end. The fine steel dust formerly so injurious to the health of the hand-grinders, is now drawn away from the operative by the suction of a strong current of air. The stamping of these two-length blanks in the middle by the hand-worked stamping machine, so as to produce the flat of the eyes and the mark for the holes, as well as the punching of the holes by a screw press, can now be accomplished by more expeditious machines. By the newer method, the wire blanks are automatically fed into a quick-running belt-driven machine, in which a punch and dies form the prints or flats for the eyes. Then two oval holes are punched through the two prints of each blank by a vertical belt-driven punching-machine. After being eyed the still double blanks — they are now rather double needles joined at the heads by thin fins — are "spitted" through their eyes on two wires flatted at one end to retain them. The burr made by the punch and die (stamping) is now removed by filing the spitted needles on both sides, and after being broken in two between the heads, which are then also smoothed by filing, a row of single needles is left on each spit.

The needles then undergo a tempering process. They are first hardened by being laid on a plate and raised to a red heat in a furnace, after which they are dipped in cold oil, kept cool by running off a portion as it gets warm, and replacing it by an equal quantity of cold oil. The needles, now hard and easily broken, are made less brittle by placing them on a continuous band of wire gauze, which travels slowly over gas flames. They are now rolled one by one under the finger on a smooth stone, and thus the bent ones are weeded out. In parcels of 50,000 they are next washed and scoured with soap to remove any of the oil used in tempering, which still adheres, and the eyes are afterward "blued" to soften them. In the case of needles of fine quality the eyes are gilt. By one method the eyes are polished by threading them loosely on wires carried by standards fixed to a tray or platform, which is moved rapidly with a reciprocating motion in a horizontal plane. In about one hour, with the assistance of a little fine emery and oil, the constant swinging of the needles on the wire smooths their eyes so as not to cut the thread. But the eyes of the best needles are hand-polished with fine emery on flax threads. The next step is to grind the heads and set the points by hand on a rapidly-revolving stone of fine texture. For the final polishing of the shanks, the needles are fed in a longitudinal direction, in rows one deep, between transverse leather-covered rollers, with holding rollers above them. Besides turning on their own axes, a lateral as well as a backward and forward motion is given to the rollers, which produces a high polish on the needles. The needles now require to be laid with their heads in one direction. A gun-metal disk revolving vertically takes up each needle by a groove in its periphery, and lets it fall on an inclined glass plate. Owing to the taper form of the pointed ends of the needles, they describe an arc in revolving so that those with the points in one direction roll to the right and the others fall round to the left. The finished needles, though intended to be of the same size, always differ to some extent in their lengths, so that those of exactly one size require to be separated

from other lengths by the sorting process in which gauges are used. Lastly, the needles are papered either by being spitted on cloth pasted to paper, or by being made up into small packets, in which case the bits of paper are cut and folded in a machine like that used for envelope-making.

Special kinds of needles are required for sewing canvas, for upholstering, in surgical operations, etc. Knitting needles are slender straight rods with rounded ends, and are used in pairs or sets of four or five. They vary in length and are made of wood, bone, or ivory, but chiefly of steel. Crochet needles have a hook at one end. Some needles are used in machinery. They are made of steel and are used for hosiery and stockinet work. Sewing-machine needles have a hook, eye, or barb at the pointed end, and are used with a single thread in making a single loop stitch both with eye and with barb. The best known sewing-machine needle is the one with the eye at the pointed end, having a long groove on one side and a short groove on the opposite. The needle used on leather is the wax-thread needle, and includes many shapes. Instead of an eye these needles are formed with hooks by which the thread is pulled through a hole made by an awl. The welting needle is a section of a circle in shape, used for putting welts on boots and shoes.

In the United States the manufacture of needles has become an important industry. The total output for 1901 amounted to 1,120,536 gross, the product being valued at $1,027,949.

Needle Gun. See FIRE-ARMS; ORDNANCE.

Needle-ore, the common name for Aikinite also called Aciculite and acicular bismuth. It is a sulphid of bismuth, lead and copper, and is found native in various localities. It has a dull metallic lustre and is of a blackish lead-gray color. It occurs in embedded acicular crystals of needle-like formation and hence derives its name.

Needle Peak, a mountain of the Panamint Range in the southeastern part of Inyo County in California. It takes its name from its peculiar sharp pointed summit. It is in a region which bears many marks of the Glacial period, the shape of the mountains, the large number of glacial lakes, the markings on the rocks, and the vegetation. Needle Peak is southwest and a short distance from "Death Valley."

Needlefish, a marine gar of the genus *Tylosurus* (see GAR), especially *T. notatus.*

Neefs, nāfs, more correctly, NEEFFS, **Pieter,** the Elder, Dutch painter: b. Antwerp about 1578; d. there between 1656 and 1661. He was a pupil of the painter of architectural views, Hendrik van Steenwijck (q.v.), began his career as a painter in the same department of art in 1605, and in 1609 was elected a member of St. Luke's Guild of painters in Antwerp. His paintings are numerous, and he is well represented in the Louvre at Paris, the Pinakothek at Munich, the Museum at Ghent, the Gallery at Dresden, and other European collections. They are mainly interiors of churches, the gloom of the building being lit up with torches or tapers and are remarkable for aërial and linear perspective. The technique is delicate and highly finished. He generally secured the services of some other artist to introduce figures in his views, among others Teniers, Francken and Van Thulden.

Neenah, nē'na, Wis., city in Winnebago County; on Lake Winnebago at its outlet, and on the Fox River; also on the Chicago, M. & St. P., the Wisconsin C., and the Chicago & N. R.R.'s; about 50 miles north by west from Milwaukee and 30 miles southwest of Green Bay. It is on an island upon which is also Menasha, the two cities being really one in commercial interests, but each having an independent municipal government. Neenah was settled in 1846 and in 1850 was incorporated as a village. In 1873 it received its city charter which was revised in 1883. The chief industrial establishments are stove works, flour and paper mills, foundries, machine shops, shoe factory, brick works, tobacco factories, and lumber mills. There is a large trade in manufactures, lumber and farm products. The city is well built and has many attractions for tourists. It is a favorite fishing resort. It has several parks, a commodious opera house, city buildings, several fine churches and school buildings. It has a fine public library. The waterworks are owned and operated by the city. Pop. (1890) 5,083; (1900); 5,954.

Neer, nār, **Aart van der,** Dutch painter: b. Amsterdam 1603; d. there 9 Nov. 1677. He became famous in his native city about 1640 and was particularly happy in moonlight effects among the canal scenery of Holland, as well as in winter landscapes, skaters on the ice, fires or conflagrations. These midnight scenes of raging flame are sometimes filled with figures, which give them a powerful dramatic effect. His pictures are found in most public galleries. He ended his days as an innkeeper.

Neerwinden, nār'vĭn-dĕn, Belgium, a village in the province of Liège, 16 miles from Louvain, which gives its name to two battles fought in the vicinity: (1) on 29 July 1693 when the French under the Marshal of Luxembourg gained a victory over the English and Dutch allies under William III. of Britain; (2) on 18 March 1793 when the French under Dumouriez were defeated by the Austrians under the Prince of Coburg.

Nees von Esenbeck, nās fŏn ā'zĕn-bek, **Christian Gottfried,** German botanist and natural philosopher: b. in the Odenwald 14 Feb. 1776; d. Breslau 16 March 1858. He was long a practising physician, but became professor of botany successively at Erlangen (1818), Bonn, (1819), Breslau (1831), and Berlin (1848–52). He displayed much originality of thought in his 'Naturphilosophie' (1841), forming Vol. I. of his uncompleted 'System der spekulativen Philosophie.' Among his other writings are: 'Handbuch der Botanik' (1820–1); 'Bryologia Germanica' (1823–31).

Neesima, nē'sĭ-ma, **Joseph Hardy,** Japanese educator: b. Tokyo, Japan, 14 Feb. 1843; d. Kioto, Japan, 23 Jan. 1890. He came to the United States to be educated and found a friend in Alpheus Hardy whose name he adopted. He studied at Amherst and continued his theological course at Andover and upon his return to Japan in 1874 was warmly received by his countrymen. He founded Dōshisha College at Kioto and was

its president. See his 'Life and Letters' edited by Arthur S. Hardy (1892).

Nef, John Ulric, American chemist: b. Herisau, Switzerland, 14 June 1862. He was graduated from Harvard University in 1884. In 1887–9 he was professor of chemistry in Purdue University, Lafayette, Ind., and in 1889–92 he was engaged at Clark University, South Atlanta, Ga. He became professor of chemistry in the University of Chicago in 1892 and since 1896 has been head professor of that department.

Neff, nĕf, **Felix,** Swiss philanthropist: b. Geneva 8 Oct. 1798; d. there 12 April 1829. He entered the army, rose to the grade of sergeant in the artillery, but at 21 devoted himself to the elevation of the people of the Fressinières valley, and in 1823 settled among them as pastor, teacher, engineer and farmer. His noble work transformed the degraded inhabitants of his great parish and speedily wore out his health so that shortly before his death he had to retire to Geneva.

Negapatam, nĕg-a-pa-tăm', India, a town and port of the Tanjore district, Madras. It has an active trade with Ceylon, the Straits Settlements, etc., and is the terminus of the South Indian Railway. It was an early settlement of the Portuguese; was taken by the Dutch in 1660, and by the British in 1781. Pop. (1901) 56,455.

Negative Quantity. See MATHEMATICS.

Negatives, Development and Treatment of. The principles of development of both photographic glass dry-plate and film negatives are the same. Glass plate or film negatives may be developed in a photographic dark-room or in special small portable dark-rooms or daylight developing machines. Photographic dry plates have spread upon the surface a film of a gelatine emulsion carrying and incorporated with it a certain amount of bromide of silver. The emulsion is flowed over the plate surface in a warm fluid condition, which solidifies when cooled into a film. Sensitized photographic films are prepared by the emulsion spread upon a transparent support resembling celluloid. When the prepared glass plate or sensitized film is exposed in the camera, the light acts upon the gelatino bromide of silver film in such a way, it is believed, as to convert the bromide of silver in the film into a sub-bromide which becomes thereafter susceptible to the action of a reducing agent known as the developer. The bromide of silver not acted upon by the light is not affected chemically by the developer. The chemical change which the developer induces in the bromide of silver, is a reduction of the light affected parts, to metallic silver. Anything which will effect this reduction is known as a developing agent. There are numerous new ones being added continually to the list. Most developers are derivatives from benzine, common ones being pyrogallol, known as «pyro,» quinol, amidol, metol, ortol, glycin, and eikonogen. While any of the developing agents alone would reduce the exposed silver bromide to metallic silver, in practice it is found best to combine the developing agent with an alkali, carbonate of soda, ammonia or carbonate of potash. The alkali is called the accelerator. To prevent rapid oxidization of the alkaline developer, sodium sulphite is added and preserves the developer prior to the mixture with it of an alkali, oxalic acid, as well as other acids of a similar character like sulphuric or sulphurous are added, which will keep the solution from discoloration. There are many different developing agents and many different formulæ for making developing solutions. These differ slightly from each other in their action, but the general method of use is the same. In compounding developers it is sometimes advisable to introduce potassium bromide, or ammonium bromide, particularly in the development of plates fully or somewhat over-exposed. They are known as restrainers and have the power of retarding the action of the developer, which is sometimes desirable. Instead of dissolving the bromide of potassium or ammonia in the developer, it is usual to prepare a weak solution of bromide in water about five grains to five or eight ounces of water and immerse the plate in this solution for three or four minutes, then remove and transfer the plate to the developing tray and pour upon it the normal developer. The preliminary bromide treatment checks the rapidity of development and prevents an overexposed plate from becoming flat or foggy.

In general to obtain the proper density in the film for most commercial plates, it has been found that four grains of pyrogallic acid, metol, ortol, glycin, pyro catechin, adurol, eikonogen, diogen, imogen, edinol, and other similar developer agents, to the ounce of water is about the right proportion. Bromide of potassium aids in increasing the density. In some cases where it is desired to secure thin quick printing negatives full of detail the percentage of pyrogallic acid can be reduced one-fourth.

The method of developing film or plates in a dark-room is as follows:

The sensitive dry plate must be removed from the original package in a dark room or a room illuminated only by a reddish orange colored light, also for inserting in the plate in the holder and development, both are done under the same condition. After removing the plate from the plate holder, or film from film spool, it is well to place them in clear water and allow them to soak for a few minutes. This insures the developing solution flowing evenly over the surface of the film, which is essential for even development. The plate or film strip is then placed in a tray of developing solution, previously prepared, or, in the case of glass plates, the solution may be poured over the plate in the tray. The developer at once begins its action and should be kept in motion by rocking the tray, or the film should be passed through and through the developer until development is complete. In about a minute after immersion, parts of the plate are seen to grow dark where the developer is changing to metallic silver the light affected silver bromide. The operator watches the progress of the change by holding his plate up to the colored light from time to time.

In about four or five minutes, with a normal developer, all the susceptible silver bromide has become metallic silver, forming the negative image of the object photographed. The silver is densest where the light has acted longest on the sensitive film; thinnest where there was the least light as in the shadows. When the film is fully developed so that no further details

appear in the shadows, the plate or film is rinsed in water to remove the developer, and is ready for the second chemical step, called "fixing."

The chemical commonly used for this process is hyposulphite of soda — "hypo" in the photographic vernacular. To prepare the fixing solution, about one ounce of "hypo" is dissolved in six ounces of water and the solution is poured into a separate tray in which the negative is immersed. The action of the solution on the negative is to dissolve away the unreduced silver in the plate or film, a process requiring about five minutes. As the action of the fixer proceeds, the milky color of plate or film is seen gradually to disappear. When all the soluble silver has been removed — indicated by the total disappearance of the whitish color — the negative is chemically complete and may be exposed to light with safety. The negative should now be removed from the "hypo," rinsed in clear water and placed in a bath of alum and water for a few minutes. Instead of alum a formaline solution may be used. These solutions toughen the gelatine so that it will not be readily marred or scratched in subsequent handling. The negative should then be washed thoroughly in water for about an hour to eliminate all the hypo and alum. If a glass negative, it may be immediately placed in a rack to dry and the drying hastened by placing the rack in a window or in front of an electric fan. In the case of film negatives, a short soaking in a glycerine solution is advisable. This is to prevent the contraction of the gelatine side of the film, in drying, from curling the film. After removal from the glycerine solution, the negative is dried without washing. Drying requires a number of hours under ordinary conditions. When dry it is advisable to wipe the back of film negatives with a soft cloth moistened in benzine to remove the glycerine, which is sticky.

Glass plate negatives are either developed one at a time or as many as will cover the bottom may be placed in the developing tray at once. Film may be developed in the entire strip of 2, 4, 6, 10 or 12 negatives, as the film cartridges are prepared; or they may be cut apart and each exposure handled separately. The cutting apart may be done at any time after development has proceeded sufficiently to show the dividing line between the exposures on the film strip. The temperature of both developing and fixing solutions should be between 60 and 70° F., as should the alum hardening bath. If the temperature of the solutions is materially higher, the gelatine emulsion softens unduly, although development is accelerated. If the solutions are below 60°, development is retarded.

Sometimes after development, negatives are found to be too "dense" to give good results in printing — that is, the metallic silver has formed too thick over the whole negative, or parts of it. This may be due to several causes, which are not in the province of this article to explain. "Dense" negatives may be improved by what is called reducing. This is done by immersing the negative, previously washed with care, in a weak bath of ferri-cyanide potassium, a small amount of hyposulphite of soda, and water. This solution gradually dissolves away the reduced metallic silver of the negative image. When enough has been removed to make the negative of proper density, the reduction is checked by washing, and the negative is dried in the usual way. Negatives may be reduced locally by applying the solution to the parts with a small brush. In place of ferricyanide of potassium, persulphate of ammonia without hypo can be used. The formula is as follows:

Persulphate of ammonia	15 grains
Water	1 ounce

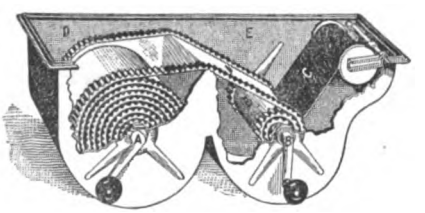
Make a fresh solution each time and add two drops of nitric acid. The salt readily dissolves. The negative if dry should be soaked for half an hour in water and then be immersed in the ammonia solution. Reduction occurs gradually, when sufficient wash the negative under the tap and immerse for ten minutes in ten per cent solution of sodium sulphite for two or three minutes, which checks the action. Then wash and dry.

Negatives are sometimes underdeveloped; owing to a very short exposure negatives can not be developed far enough and when fixed are too thin to give good prints, not enough metallic silver having been formed. Such negatives may be "intensified," which is a sort of re-development. A negative must be well washed to eliminate the hypo prior to the intensification process. There are different ways of accomplishing this with a variety of formulæ. A common way is to immerse the negative in a solution containing bi-chloride of mercury. This changes the dark negative image to a white color, the metallic silver in the film having been reduced to silver chloride by association with the mercuric chloride. The whitened or bleached negative is now transformed, after being well washed with water, by immersing in a bath of water and dilute ammonia or a solution of sodium sulphite and water, until the white color becomes brown or black. The action of the alkali changes the chloride to metallic silver again. The negative now possesses greater opacity in the high lights and will yield more vigorous and brilliant prints. The intensifying process may be repeated by washing the film carefully between each step. Negatives may be intensified locally by applying the chemical solutions to the desired parts.

How far to carry the development of glass plates or film is an important point in negative making. Some operators rely entirely on their judgment in the case of each negative, examining it by the dark-room light to see when the desired density has been attained. The uncertainty of results in thus trying to stop development at just the right point resulted in the introduction of what is known as the "factorial system" of development. This system is based on the theory that a certain definite relation exists between the total length of time required for development, and the time elapsing between immersing the plate in the developer and the first appearance of the image. Different developers have different factors according to their various actions. So, multiplying the time elapsing from immersion in developer to appearance of image, by the factor of the developer used, gives total length of development needed. The factor of any developer at a definite uniform temperature can be determined by experiments.

Underlying this "factorial system" is the theory that in every case the time of exposure of plate or film alone determines the final quality of the negative. The eminent authorities Alfred Watkins and Hurter and Driffield hold this view, which is being generally accepted. The gradation between light and shadow in the negative (not its general "density" or "thinness") really determines its printing quality; that what this scale of gradation or ratio of contrast is going to finally be, is fixed before the image makes its appearance in the developer. But, if the operator knows before development of over or under exposure, he may influence the contrast in his negative somewhat by altering his developer. In view of the above, time development is now recognized by many workers as the correct way of development, the length of time to elapse between the immersion of plate or film into the developer to the completion of development varying with solutions of different compositions and their temperatures.

The Kodak developing machine is based on the principles of time development. This machine is for film only. With it film is developed without a dark-room. Introduced in 1901 the Kodak developing machine became immediately popular with film workers and has become the favorite method of development. The advantages of machine development are many. No dark-room is needed; the operations are simpler and therefore more likely to be successful. The general results are better than by the older development method. With the Kodak developing machine the operator of course does not have to depend upon his own judgment as to when development should cease. He times development, thus being certain of his results. The chemicals to be used with the machine are prepared in powder form, only needing to be combined with water to form the proper solutions. The chemical principles of development in the Kodak developing machine and the dark-room are identical. The machine itself is a light-tight metal box containing a colored transparent apron. Its operation is as follows:



Kodak Developing Machine.

The spool of film is inserted in the machine so that the black paper, which protects the roll of film from light in the cartridge, will lead from the top, as shown in cut, the transparent apron (F) having first been wound onto arbor "A." The black paper is then pulled out and the end attached to arbor "B" by slipping under the wire guard. Arbor "B" is then turned to the right until the word "stop" printed on the black paper to mark the beginning of the film strip appears. The developer is then poured into compartment "E," the end of apron (F) is hooked onto arbor "B" and the top put on the machine. The operator then turns handle to the right until the time of development (four or five minutes) has expired. The film "G" winds up inside of apron, but with the face not touching it, thus allowing free action of the developer. The cover is then removed from machine, developer poured off and fixing solution poured in; the cover replaced and the handle turned again for about five minutes, when the fixing is complete. After fixing, the film is removed from machine by taking hold of either end of black paper and pulling out of machine, the film being taken hold of when it appears and pulled free from the black paper. Nothing remains to be done except to wash the film, harden it in the alum solution and pin up to dry. Film must always be developed in the entire strip when using the machine.

Developing Formulæ.

PYRO DEVELOPER.

1.

Pyrogallic acid	½ ounce
Sulphuric acid	20 minims
Pure water	32 ounces

2.

Sulphite of Soda (anhydrous)	3 ounces
Carbonate of Soda	2 "
Pure water	32 "

To develop take

Water	2 ounces
No. 1	1 ounce
No. 2	1 "

EIKONOGEN DEVELOPER.

1.

Eikonogen	1 ounce
Sulphite of Soda (crystals)	3 ounces
Water	60 "

2.

Carbonate of Potash	3 ounces
Water	30 "

To develop take

No. 1	2 ounces
No. 2	1 ounce
Water	2 ounces

METOL DEVELOPER.

A.

Distilled or boiled water	10 ounces
Anhydrous Sodium Sulphite	250 grains
Metol	50 "

B.

Distilled or boiled water	10 ounces
Potassium Carbonate C. P.	1 ounce

For normal developer take 3 parts of A and add 1 part of B.

For over-exposure take 3 parts of A, add ½ part of B, 4 parts of water, and 10 to 60 minims of a solution of Potassium Bromide, 1 to 10.

Carbonate of Soda can be substituted for Carbonate of Potash.

METOL-HYDRO DEVELOPER.

Make two solutions as follows, each will keep a long time:

1.

Metol	50 grains
Hydroquinone	40 "
Potassium Metabisulphite	½ ounce
Distilled water	10 ounces

2.

Sodium Carbonate (crystals)	2 ounces
Distilled water	10 "

For use mix equal parts. Bromide of Potassium should be added in small quantities in cases of great over-exposure.

EDINOL DEVELOPER.

Edinol	240 grains
Potassium Metabisulphite	120 "
Sodium Carbonate	800 "
Sodium Sulphite	400 "
Potassium Bromide	40 "
Water	10 ounces

For a developer put 1 part of above into 7 parts of water. Can be used for several negatives. Is of a light straw color.

FIXING SOLUTION.

Hyposulphite Soda	4 ounces
Water	16 "

ALUM BATH.

Saturated solution of alum allowed to settle and decant.

TO MAKE FARMER'S REDUCER.

Dissolve 1 ounce Ferri-Cyanide of Potassium in 9 ounces water, forming a 10 per cent solution. Add enough of this solution to fresh Hypo bath to make it a light straw color.

ANOTHER REDUCER.

Ferric Chloride	1 dram
Hydrochloric Acid	2 drams
Water to make 10 ounces.	

INTENSIFIER.

1.

Mercuric Chloride	1 dram
Ammonium Chloride	1 dram
Water	4 ounces

2.

Ammonia (.880)	1 dram
Water	4 ounces

Bleach in No. 1, wash well, and blacken in No. 2.

Bibliography.— Cook, 'More Light on Negative Making'; Lambert, 'The Perfect Negative'; Todd, 'Practical Reference Book Part II.'; Clark, 'Development'; Adron, 'Modern Developers and How to Use Them'; Penlake, 'Developers — Their Use and Abuse'; Abney, 'Treatise'; Brothers, 'Photography'; 'The Photography Annual'— An English Year Book, and 'Photo Miniature' (Vol. II., No. 15.).

L. B. JONES,
Eastman Kodak Company.

Negaunee, nĕ-gâ'nē, Mich., city in Marquette County; on the Duluth, S. S. & A., and the Chicago & N. R.R.'s; about 12 miles west by south of Marquette. It was settled in 1870 and in 1873 was chartered as a city. It is in the iron region of the State and has within the city limits several productive iron ore mines. The ridge (Iron Mountain) upon which Negaunee is located is over 1,000 feet above Lake Superior. The chief industries of the city are connected with the mining and shipping of iron ore. It has excellent public and parish schools. The city owns and operates the electric-light plant and the waterworks. Pop. (1890) 6,078; (1900) 6,935.

Negley, nĕg'lĭ, **James Scott,** American soldier: b. Liberty, Pa., 22 Dec. 1826; d. Plainfield, N. J., 8 Aug. 1901. He was educated at the Western University of Pennsylvania and served in the ranks through the Mexican War. At the outbreak of the Civil War he organized a brigade, was commissioned brigadier-general and joined the Army of the Ohio. He defeated the Confederates at Lavergne in 1862 and was promoted to the rank of major-general for gallant conduct at Stone River. Commercial and railway enterprises engaged his attention after the war and in 1869–73, 1875–7, and 1885–7 he was a member of Congress.

Neg'ligence, in law, there are recognized three degrees of negligence: *ordinary,* the want of ordinary care or diligence; *slight,* the want of great care or diligence; and *gross,* the want of slight care or diligence. The person charged with negligence must have been under an obligation to exercise care or diligence either assumed by contract or imposed by law. An alleged act of negligence must always be the proximate cause of the injury sustained; but any injury caused to a person by another who at the time is exercising due care is not actionable. The question of negligence is usually one for a jury, and the onus of proof rests on the plaintiff, except when the thing resulting from the negligence speaks for itself. A master is responsible for the negligence of his servants, but in no case can redress be had where contributory negligence on the part of the plaintiff is proved.

Nego'tiable Instrument, any note, bill, contract or document which can be endorsed and transferred to a third party. In addition to negotiable paper (q.v.), other written instruments considered negotiable are deeds, insurance policies, contracts, liens, judgments, etc.

Negotiable Paper, either promissory notes or bills of exchange, payable to the bearer or order. These are evidences of debt or money due and may be transferred to a third party by endorsement or delivery. The third party may sue for the amount in his own name. A sealed paper, unless issued by a corporation or State, is not usually deemed negotiable. The demand for payment of paper thus negotiated must be made when the note falls due, or to use the common phrase, at its maturity. But this is not at the expiration of the time when the note is made payable on the face of it. The law adds three whole days, which are called days of grace. At first, these were, as the name intimates, days of favor or mere indulgence; but usage, and now law, have converted them into an absolute right. In most of the States, statutes provide that all negotiable paper, not payable at sight or on demand, is entitled to three days of grace, unless it be expressly agreed otherwise. This is sometimes done, but not often; and the words used for this purpose are, simply, "without grace." One distinction is important. These days retain so much of their original character of mere indulgence, that if the last day of grace falls on Sunday, or on any holiday on which payment cannot be demanded, it is now due, and demand must be made, on the Saturday or other day preceding. But if paper without grace, or any payment not entitled to grace, falls due on Sunday, or any other legal holiday, the payer now gains a day, because payment cannot be demanded until Monday, or the day after the holiday.

Negri, nā'grē, **Ada,** Italian poet: b. Lodi, near Milan, 3 Feb. 1870. She became a schoolteacher at Motta-Visconti, on the Ticino, and in 1892 published a small volume of poems, 'Fatalità,' which in Italy aroused a general interest and by 1894 had passed through six editions. She received from the city of Florence an honorary stipend of $340 (1,700 lire) annually for a period of 10 years, and was appointed an instructor in literature at the Scuola Normale of Milan. His further work includes the volume 'Tempeste.' Much of her verse is an appeal for the working-classes. There is a German translation by Jahn of some of the poems. Consult: Heyse, 'Deutsche Rundschau' December 1894; Dornis, 'La Poesie italienne contemporaine' (1898).

Negritos, nā-grē'tōz, the negroid race inhabiting the Philippine Islands, the Andaman Islands, and the Malay Peninsula; in the Philippines they are called Aëtas or Itas. The negritos of the Philippines may be considered typical of their race; they are of small stature, seldom being more than four feet eight inches in height, with brachycephalic head form; their skin is dark, almost black, their hair short and woolly, and their features resemble those of the negroes, though the lips are not so thick. They are true savages, depending for their food upon hunting and wild roots; they do not build villages nor stable huts, but roam through the mountains in small bands of 50 or 60. They make baskets of a rude sort and their bows and arrows for hunting; tattooing is regularly practised among them.

They are found chiefly in the islands of Luzon, Panay, Palawan, Negros, Cebu, and Mindanao; and their number is estimated in the later United States reports as 30,000. Their origin and relationship to other races present many interesting ethnological questions which have not been satisfactorily settled; their geographical distribution, however, leaves little doubt that they were the original inhabitants of the Philippine Archipelago and at one time practically the sole possessors of the islands; they were probably driven back into the mountainous interior by invasions of primitive Malayans (see PHILIPPINE ISLANDS).

Negro, a name properly applied to the races inhabiting the continent of Africa, originally between lat. 10° N. and 20° S. The term does not include the inhabitants of Northern Africa, the Egyptians, Berbers, Nubians, Abyssinians and others. Neither do the Hottentots in South Africa belong to the negro race. The term negro, therefore, is not synonymous with African, and is not a national appellation, but denotes an ideal type constituted by certain physical characters, namely, black skin, woolly hair, flat nose, thick everted lips, and a prognathous form of skull.

Out of Africa, negroes are found in the United States, the West Indies, Brazil, Peru, the Cape Verde Islands, and Arabia. They are rare in Europe, Polynesia, and Australia. Negroes were nearly unknown to the Hebrews and the Homeric Greeks; the Egyptians, however, about 2300 B.C., became acquainted with negroes through the conquests of their rulers, and represented them on their monuments as early as 1600 B.C.; for nearly 35 centuries the type has remained unchanged in Egypt. Negroes were unknown to the Greeks until the 7th century B.C., their Ethiopians being merely any people darker than the Hellenic, like the Arabs, Egyptians, Libyans, or Carthaginians, none of which are negroes.

The negro race is divided naturally into two great divisions: (1) African negroes, (2) Papuans or Melanesians. There are four sub-divisions of African negroes, according to locality: (1) West Sudan and Guinea; (2) Central Sudan and Chad Basin; (3) East Sudan and Upper Nile; (4) South Africa. Authorities estimate their number at 130,000,000, with probably 20,000,000 full-blood or half-caste negroes, either slaves or descendants of slaves, chiefly in tropical or sub-tropical America, and enumerate the following as the chief anatomical and physiological points in which the negro differs most from his own congeners:

1. The abnormal length of the arm, sometimes reaching to the knee-pan.
2. Prognathism (Facial angle 70°, in Caucasian 82°).
3. Weight of brain, 35 ounces (in gorilla 20 ounces, average Caucasian (Europe or America) 45 ounces).
4. Full black eye, black iris, and yellowish sclerotic coat.
5. Short, flat, snub nose, broad at extremity, with dilated nostrils and concave ridge.
6. Thick, protruding lips, showing inner surface.
7. Very large zygomatic arches.
8. Exceedingly thick cranium, enabling him to use the head as a weapon of attack.
9. Weak lower limbs, terminating in a broad, flat foot, with low instep, projecting and somewhat prehensile great toe, and "lark heel."
10. Complexion deep brown, blackish, or even black, not due to any special pigment, but to the greater abundance of coloring matter in the Malpighian mucous membrane.
11. Short, black hair, distinctly woolly, not frizzly.
12. Thick epidermis, cool, soft, and velvety, mostly hairless, and emitting a peculiar odor described as hircine.
13. Frame of medium height, thrown somewhat out of the perpendicular by the shape of the pelvis, the spine, the backward projection of the head, and the whole anatomical structure.
14. The cranial sutures, which close much earlier in the Negro than in other races.

The native African negroes display considerable ingenuity in the manufacture of weapons, in the working of iron, in the weaving of mats, cloth, and baskets from dyed grasses, in the dressing of skins of animals, in the structure of their huts and household utensils, and in the various implements and objects of use in a barbarous state of society. Their religion consists in the worship of idols and fetishes, representing a supreme power which they all acknowledge; they believe also in good and evil spirits, in witchcraft, charms and spells, omens, lucky and unlucky days, etc.; they make fetishes of serpents, elephants' teeth, tigers' claws, and many similar objects, and reverence wooden images and sacred things, which they think have received a peculiar power from their divinities to drive away evil spirits, and protect them from danger, disease, and witchcraft. They make prayers and offerings to their idols, and have sacred songs, festivals, dances, ceremonies, and places; they sacrifice animals and sometimes human victims, especially during funeral obsequies; they have their priests and holy men, who are also magicians and doctors. They believe generally in an after life, without any distinct idea of retribution, and some tribes in the transmigration of the human soul into a gorilla, or other bird, beast, reptile, or fish. Being very fond of music, they have many ingeniously contrived musical instruments, generally of a noisy character; they have a keen sense of the ridiculous, and are of a cheerful disposition; though cruel to their enemies and prisoners, and setting little value on human life; they are naturally kind-hearted, hospitable to strangers, and communicative of their joys and sorrows; the females are remarkably affectionate as mothers and children, and as attendants on the sick, even to foreigners. They are less dirty in their persons and dwellings than most other barbarous races. For the history and development of the negro in America, see NEGRO IN AMERICA and NEGRO EDUCATION.

References.— Bleek, 'The Languages of Western and Southern Africa' (1856); Cust,

'Modern Languages of Africa' (1883); Keane, 'Man, Past and Present' (1899); Johnston, 'The River Congo' (1884); Junker, 'Travels in Africa' (1892); Schweinfurth, 'The Heart of Africa' (1874).

Negro Education. The negro race in America has grown from 20 native Africans imported into the country as chattel slaves in 1619, to 10,000,000 of free men, entitled under the Federal Constitution to all the rights, privileges and immunities of citizens of the United States, in 1904. The great task of educating these millions has been a phenomenal undertaking and the results have been still more phenomenal.

It was the general policy of the 16 slave-holding States of the South to prohibit by fine, imprisonment and whipping the giving of instruction to blacks, mulattoes or other descendants of African parentage, and this prohibition was extended in most of the slave States to "free persons of color" as well as to slaves.

But it has been the general policy of the slave system in all ages to keep the slaves in ignorance as the safest way to perpetuate itself. In this respect the American slave system followed the beaten path of history, and thus furnished the strongest argument for its own undoing. The ignorance of the slave is always the best safeguard of the system of slavery, but no such theory could long prevail in a democracy like ours. There were able and distinguished men among the slaveholders themselves who rebelled against the system and the theories by which it sought to perpetuate itself. Such Southern men as Thomas Jefferson, Henry Clay, Cassius M. Clay, and hundreds of others, never became reconciled to the system of slavery and the degradation of the slave.

The general character of the laws enacted on this subject by the slave States can be inferred from the following law, passed by the State of Georgia in 1829:

> If any slave, Negro, or free person of color, or any white person shall teach any slave, Negro or free person of color to read or write either written or printed characters, the said free person of color or slave shall be punished by a fine and whipping, at the discretion of the court; and if a white person so offend, he, she or they shall be punished with a fine not exceeding $500 and imprisonment in the common jail, at the discretion of the court.

There were no laws in the slave code more rigidly enforced than those prohibiting the giving or receiving instruction by the slaves or "free persons of color." And yet in nearly all the large cities of the Southern States — notably in Charleston, Savannah, and New Orleans — there were what were styled "clandestine schools," where such instruction was given. Those who maintained them and those who patronized them were constantly watched and often apprehended and "beaten with many stripes," but the good work went on in some sort until 1860, when the war that was to be "the beginning of the end" of the whole system of slavery, put a stop to all such effort for the time being.

There is no more heroic chapter in history than that which deals with the persistence with which the slaves and "free persons of color" in the slave States sought and secured a measure of intellectual and religious instruction; for they were prohibited from preaching or receiving religious instruction except by written permit and when at least five "white men of good reputation" were present at such gatherings. But there has never been a time in the history of mankind when repressive laws, however rigidly enforced, could shut out the light of knowledge or prevent communion with the Supreme Ruler of the universe by such as were determined to share these noblest of human enjoyments. True, only a few, a very few, of the blacks and "free people of color" were able to secure any appreciable mental instruction; but the fact that so many of them sought it diligently in defiance of fines and penalties is worthy of notice and goes far toward explaining the extraordinary manner in which this people crowded into every school that was opened to them after the war of the rebellion had swept away the slave system and placed all the children of the republic upon equality under the Federal Constitution. Nor was this yearning for mental instruction spasmodic; 34 years after the war all the school houses, of whatever sort, opened for these people are as crowded with anxious pupils as were the modest log school houses planted by New England men and women while the soldiers of the disbanded armies of the North and South were turning their faces homeward. A race so imbued with a love of knowledge, displayed in slavery and become the marvel of mankind in freedom, must have reserved for it some honorable place in our national life which God has not made plain to our understanding.

In the free States of the North very little more provision was made, as late as 1830, by the State for the education of the Negro population than by the slave States. There was no prohibition by the State against such instruction, but there was a very pronounced popular sentiment against it, when prosecuted by benevolent corporations and individuals. In 1833 the Connecticut legislature enacted the following black law, for the purpose of suppressing a "school for colored misses" which Miss Prudence Crandall had been forced to open in self-defense, at Canterbury:

> Whereas, attempts have been made to establish literary institutions in this State for the instruction of colored persons belonging to other States and countries, which would tend to the great increase of the colored population of the State, and therefore to the injury of the people; therefore,
>
> Be it enacted, etc., that no person shall set up or establish in this State any school, academy, or other literary institution for the instruction or education of colored persons, who are not inhabitants of this State, or harbor or board, for the purpose of attending or being taught or instructed in any such school, academy or literary institution, any colored person who is not an inhabitant of any town in this State, without the consent in writing, first obtained, of a majority of the civil authority, and also the selectmen of the town, in which such school, academy or institution is situated, etc.
>
> And each and every person who shall knowingly do any act forbidden as aforesaid, or shall be aided or assisting therein, shall for the first offense forfeit and pay to the treasurer of this State a fine of $100, and for the second offense $200, and so double for every offense of which he or she shall be convicted; and all informing officers are required to make due presentment of all breaches of this act.

The cause of this law was the acceptance by Miss Crandall of a young colored girl into her select school for young ladies. The parents of the white students insisted upon the dismissal of Miss Harris, the bone of contention, but Miss Crandall refused to do so, when the white students were withdrawn. Miss Cran-

dall then announced that she would open her school for "young ladies and little misses of color." The people of Canterbury protested against this course, and persecuted legally and otherwise Miss Crandall and her 20 pupils. When they found that they could not intimidate the brave woman the legislature was appealed to, and the law was enacted. Under it Miss Crandall was arrested and placed in the common jail. The case was tried three times in the inferior courts, and was argued on appeal before the court of errors 22 July 1834. The court reserved its decision and has not yet rendered it. The obnoxious law was repealed in 1838.

Schools established for the education of Negro youth were assaulted and wrecked in free States, but the good work steadily progressed. Private schools sprang up in all the Middle and New England States, Pennsylvania, New York, and Massachusetts leading in the work, their white citizens contributing largely to their support. There were many of these schools, some of them of splendid character, in Boston, Providence, New York, Philadelphia, Washington and Cincinnati. They were gradually absorbed into the public school system, and none of them now exist in an independent character, except the Institute for Colored Youth at Philadelphia, Lincoln University, in Chester County, and Avery Institute at Allegheny City, all in Pennsylvania.

In 1837 Richard Humphreys left $10,000 by will, with which the Institute for Colored Youth was started, 30 members of the Society of Friends forming themselves into an association for the purpose of carrying out the wishes and plans of Mr. Humphreys. A remarkable feature of the constitutions adopted by the trustees, in view of the present consideration of the subject by those concerned in Negro education, is the following preamble:

"We believe that the most successful method of elevating the moral and intellectual character of the descendants of Africa, as well as of improving their social condition, is to extend to them the benefits of a good education, and to instruct them in the knowledge of some useful trade or business, whereby they may be enabled to obtain a comfortable livelihood by their own industry; and through these means to prepare them for fulfilling the various duties of domestic and social life with reputation and fidelity as good citizens and freemen."

The measure of progress which has been made in public opinion and in the educational status of the Negro race in the Middle and New England States can easily be estimated by the fact that as recently as 1830 no Negro could matriculate in any of the colleges and other schools of this splendid group of States, and that now not one of them is closed against a black person, except Girard College at Philadelphia, whose founder made a perpetual discrimination against people of African descent in devising his benefaction; that Negro children stand on the same footing with white children in all public schools benefits; that the separate school system has broken down entirely in the New England States and is gradually breaking down in the Middle States, New Jersey and Pennsylvania being the only States in the latter group which still cling to the principle; and that in many of the public schools of both groups of States Negro teachers are employed and stand upon the same footing as white teachers. Indeed, Miss Maria L. Baldwin, an accomplished black woman, is principal of the Agassiz School, at Cambridge, Mass., and in the large corps of teachers under her, not one is a member of her own race.

All this is a very long stride from the condition of the public mind in the Middle and New England States when Negro children were not allowed to attend any public school or college and when a reputable white woman was persecuted, jailed and her property destroyed, in 1834, for accepting a young colored woman into her select school. This remarkable change in public sentiment argues well for the future of the Negro race and for the republic, which for more than a century has agonized over this race problem, and is still anxious about it in the 16 Southern States, where a large majority of the Negroes reside and will, in all probability, continue to reside for all time to come.

Dr. A. D. Mayo, one of the best authorities on educational matters in the United States, says that "it is still a favorite theory of a class of the representatives of the higher university and college education to proclaim the invariable legitimate descent of the secondary and even elementary schooling of the people always and everywhere from this fountain head," the Southern States, and that, "in one sense, this assertion is 'founded on fact.'" But, although most of the Southern States were committed to the theory of public education, the system of slavery stood in the way of the development of the theory. Popular education and slavery, like oil and water, will not mix. The educational energy of the South expanded rather along academic and collegiate than common school lines. The slave-holding aristocracy drew the social line against the poor whites as well as the slave blacks, and while dooming the latter to mental darkness by stringent laws, rigidly enforced, the same result was accomplished in the case of the former by the steady development of the old English theory of academy education, chartered for the most part by the State but supported almost wholly by their patrons, and therefore inaccessible to the children of the poor whites. It was due to this fact that so very large a percentage of the southern white population figured in the first census after the War of the Rebellion as illiterate and so figure to a large extent even to-day, 29 years after the beneficent operation of the public school system in all of the States of the South.

In the South, because of the existence of the slave system more than anything else, drifted away from the theory of public school education, prior to 1860, it has nobly rectified its mistake since 1870. Upon this point Dr. Mayo says, speaking of Virginia, which has always set the pace for her sister States of the South — and especially in the matter of education, under the leadership of Dr. W. H. Ruffner (from 1870 to 1882), who has been appropriately styled the Horace Mann of the South:

> But the condition of the educational destitution in which the State found itself in 1865, in the hour of its dire extremity, was the logical result of the narrow English policy it has pursued in this as in other directions; and in 1870 the cry went up, from the sea to the most distant recesses of the western mountains, for the establishment of the American people's common school.
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> In nothing has the really superior class of Vir-

ginia more notably declared its soundness, persistence, and capacity to hold fast to a great idea than in the way in which it stood by the educational ideas of Jefferson through the one hundred turbulent years from the outbreak of the War of the Revolution to the inauguration of the people's common school in 1870.

As it was with Virginia, so it was with the other Southern States. A revival was begun in public or common school education in 1870, which is still in progress, such as swept over New England and the Middle States from 1830 to 1860. Broken in fortune and bowed with defeat in a great Civil War, the South pulled itself together as a giant rouses from slumber and shakes himself, and began to lay the basis of a new career and a new prosperity in a condition of freedom of all the people and in the widest diffusion of education among the citizens through the medium of the common schools. Perhaps no people in history ever showed a more superb public spirit and self-sacrifice under trying circumstances than the people of the South have displayed in the gradual building up of their public school system upon the ruins of the aristocratic academy system. The work had to be done from the ground up, from the organization of the working force to the building of the school houses and the marshaling of the young hosts. The work has required in the aggregate, perhaps, the raising by taxation of $514,922,268, $100,000,000 having been expended in maintaining the separate schools for the negro race. This must be regarded as a marvelous showing when the impoverished condition in which the war left the South in 1865 is considered. But it is a safe, if a time-honored saying, that "where there is a will there is a way." The Southern people found a way because they had a will to do it; and it is not too much to claim that the industrial prosperity which the South is now enjoying is intimately connected with the effort and money expended in popular education since 1870.

The total enrolment of the 16 Southern States and the District of Columbia for the year 1896–7 was 5,398,076, the number of Negro children being 1,460,084; the number of white children 3,937,992. The estimated number of children in the South from 5 to 18 years of age was 8,625,770, of which 2,816,340 or 32.65 per cent were children of the Negro race, and 5,809,430 or 67.35 per cent were white children. The number of Negro children enrolled was 51.84 per cent of the Negro population and 67.79 of the white population. When the relative social and material condition of the former is contrasted with that of the latter, it must be admitted that the children of the former slaves are treading closely upon the heels of the children of the former master class in the pursuit of knowledge as furnished in the public school system.

During the year 1896–7 it is estimated that $31,144,801 was expended in public school education in the 16 Southern States and the District of Columbia, of which, it is estimated, $6,575,000 was expended upon the Negro schools. Since 1870 it is estimated that $514,922,268 have been expended in the maintenance of the public school system of the Southern States, and that at least $100,000,000 have been expended for the maintenance of the separate public schools for Negroes.

The significance of the facts contained in the two foregoing paragraphs will be appreciated by Europeans as well as Americans. The fact that 2,816,340 children of former slaves were in regular attendance in the public schools of the late slave-holding States of the South during the year and that $6,575,000 was expended for their maintenance, gathered entirely from public taxation and funds for educational purposes controlled by the States, should be regarded as the strongest arguments that could be presented to Americans or to foreigners to prove that the race problem in the United States is in satisfactory process of solution. The people of the Southern States, the old slave-holding class, have not only accepted in good faith the educational burden placed upon them in the addition of 8,000,000 of people to their citizenship, but they have discharged that burden in a way that must command the admiration of the world. That my own people are discharging their part of the obligation is shown in the statistics of school attendance and in the further fact that it is estimated they have amassed since their emancipation $300,000,000 of taxable property. While this may seem small as a taxable value as compared to the aggregate of taxable values in the Southern States, it is large, indeed, when the poverty of the Negro race in 1865, with all the advantages and disadvantages of slave education and tradition to contend with, are considered. When a race starts empty-handed in the serious business of life, what it inclines to and amasses in a given period is valuable almost wholly as a criterion upon which to base a reasonable deduction as to its ultimate future. The Negro race is compelled to go forward in the social scale because it is surrounded by forces which will not permit it to go backward without crushing the life out of it, as they crushed the life out of the unassimilable aboriginal Indian races of North America. It is clear that the Negro race, in its desire for American education, possesses the prime element of assimilation into the warp and woof of American life, and if its desire for the Christian religion be added we have the three prime elements of homogeneous citizenship as defined by Prof. Aldrini, namely, habitat, language and religion.

It seems well to say this much, adduced from the statistics of common school education in the late slave States of the 16 Southern States and the District of Columbia, where the bulk of the Negro people reside, as a logical conclusion in a problematical situation, concerning which many wise men are disposed to indulge a pessimism which confuses them as well as those who have to deal immediately with the perplexing condition of affairs. The common school statistics of the Southern States leave no room for doubt as to the ultimate well-being of the Negroes residing in those States.

The extraordinary development of the public school system of the 16 Southern States and the District of Columbia has been hastily recorded since 1870. It is a record worthy of the proud people who made it,—people who have from the foundation of the republic been resourceful, courageous, self-reliant; rising always equal to any emergency presented in their new and trying circumstances, surrounded on every side, as they were, by a vast undeveloped territory, and by a hostile Indian population, and fatally handicapped by a system of African slavery, which proved a millstone about the

neck of the people until it was finally abolished, amid the smoke and flame and death of a hundred battles in 1865. There are none so niggardly as to deny to the Southern people the full measure of credit which they deserve for the splendid spirit with which they put aside their prejudices of more than two centuries against popular common school education on the one hand, and their equally prescriptive prejudice against the education of the Negro race under any circumstances on the other. Few if any people in the various history of mankind have so completely overcome two such prejudices. On this point Dr. Mayo says:

> Almost 100 years ago young Thomas Jefferson drew up a scheme for the education of the people of Virginia, which, had it been adopted, would have changed the history of that and of every southern State and the nation. He proposed to emancipate the slaves and fit them, by industrial training, for freedom; to establish a free school for every white child in every district of the colony; to support an academy for boys within a day's horseback ride of every man in the Old Dominion, and to crown all with a university, unsectarian in religion, elective in its curriculum, teaching everything necessary for a gentleman to know. This plan received the endorsement of many of the most eminent men of the day, and exalts the fame of Jefferson as an educator even higher than his reputation as a statesman.

All that Jefferson dreamed and outlined for the people of Virginia and of the South has been more than accomplished for both races in Virginia and in the South. The possibilities of a common school, collegiate and industrial education have been placed in easy reach of all the people, and the people are justifying the splendid faith of the Sage of Monticello by the earnestness with which they are taking advantage of the opportunities provided for them by the States and a munificent Christian philanthropy — a philanthropy which has given fully $40,000,000 of money and thousands of devoted men and women teachers to illuminate the mental darkness generated by the system of slavery. Surely no better monument than this philanthropy could be erected to perpetuate the memory of Horace Mann and Henry Barnard, in relighting the fires of popular education in the Middle and New England States, for without their labors and sacrifices in this cause that philanthropy would not have been possible.

But the public school system of the Southern States had to have other and more substantial foundation than was offered at the close of the War of the Rebellion, in 1865, by the academy and college system which had been fostered and developed as best adapted to a social condition whose cornerstone was the slave system. Without this foundation, firmly and wisely laid in the fateful years from 1865 to 1870, by the initiative of the Federal Government, magnificently sustained by the philanthropy and missionary consecration of the people of the New England and Middle States, the results which we have secured in the public school system of the South from 1870 to the present time would not have been possible. All the facts in the situation sustain this view.

It is creditable to the people of the New England and Middle States that they, who had been engaged for four years in a Titanic warfare with their brethren of the Southern States, should enter the Southern States in the person of their sons and daughters, and with a voluntary gift of $40,000,000, or more, to plant common schools and academies and colleges, in the devastation wrought by the Civil War, upon the sites where the slave auction block had stood for 250 years, thereby lifting the glorious torch of knowledge in the dense mental darkness with which the slave system had sought to hedge its power; nor is it less creditable that the Southern people accepted this assistance and builded upon it a public school system which promises to equal that in any of the other sections of the republic.

In anticipation of the condition of affairs that would arise when hostilities should cease, as early as the spring of 1865, before the war was over, an act was passed by Congress providing for the relief of the destitute of the South. The act was entitled "an act to establish a bureau for the relief of freedmen and refugees." On 20 May 1865, Major-General O. O. Howard was appointed commissioner of the Freedman's Bureau. General Howard,— who founded the institution which bears his name at Washington and gave it a princely endowment,—"gave," says the historian Williams, "great attention to the subject of education; and after planting schools for the freedmen throughout a greater portion of the South, in 1870, five years after the work was begun, he made a report. It was full of interest. In five years there were 4,239 schools established, 9,307 teachers employed, and 247,333 pupils instructed. In 1868 the average attendance was 89,396, but in 1870 it was 91,398, or 79¾ per cent of the total number enrolled. The emancipated people sustained 1,324 schools themselves, and owned 592 school buildings. The Freedman's Bureau furnished 654 buildings for school purposes."

In 1879, according to the same authority, "there were 74 high and normal schools, with 8,147 students, and 61 intermediate schools, with 1,750 students in attendance. In doing this great work,— for buildings, repairs, teachers, etc.,— $1,002,896.07 was expended. Of this sum the freedmen raised $200,000. This was conclusive proof that emancipation was no mistake."

Mr. Williams says further that it appears from the reports of the Freedman's Bureau that the earliest school for freedom was opened by the American Missionary Association, at Fortress Monroe, Va., September 1861, and before the close of the war Hampton and Norfolk were leading points where educational operations were conducted; but after the cessation of hostilities teachers were sent from the Northern States and schools for freedmen were opened in all parts of the South. During the five years of its operations the bureau made a total expenditure of $6,513,955.55. No money was ever more wisely or beneficently expended. While a goodly portion of it was expended in food and clothing, and the like, for the destitute freedmen, by far the most of it went into school houses and into the salaries of school teachers, and finally became the basis if not the inspiration of the public school system of the Southern States; it certainly did become the inspiration and the foundation of the 178 schools for secondary and higher education which exist to-day independently of the public school system or of State control, although many of them are recipients of State assistance.

While the Federal Government was planting these schools among the freedmen, the people of the Middle and New England States were

sending thousands of dollars into the South and sending an army of devoted men and women to back up and carry forward the educational work among the freed people. In the extent of it, it was and it continues to be the most striking example of Christian brotherhood and benevolence in the annals of mankind. Through the agency of the Federal Government and Northern philanthropy, schools for the freed people were planted everywhere, and grew and prospered, and continue to grow and prosper, as such schools never have done before.

After 30 years of effort there are 25,615 Afro-American teachers in the schools of the South, where there was hardly one when the work began; some 4,000 men have been prepared, in part or in whole, for the work of the Christian ministry, and a complete revolution has been effected in the mental and moral character of Afro-American preachers, a service which no one can estimate who is not intimately informed of the tremendous influence which these preachers exercise everywhere over the masses of their race; the professions of law and medicine have been so far supplied that one or more representatives are to be found in every large community of the South, as well as in the North and West, graduates for the most part of the schools of the South; and all over the South are men engaged in trade occupations whose intellects and characters were shaped for the battle of life by the New England pioneers who took up the work where their soldier brothers laid it down at the close of the war. But the influence of these teachers upon the character, the home life, of the thousands who are neither teaching, preaching nor engaged in professional or commercial pursuits, but are devoted to the making of domestic comfort and happiness for their husbands and children, in properly training the future citizens of the republic, was one of the most necessary and far-reaching that was exercised, and the one which to-day holds out the promise for the best results in the years to come.

It was these New England men and women who labored all over the South from 1865 to 1870 who made possible the splendid public school results. Their labors did not end in the field of primary education in 1870; they remained at their posts until they had prepared the 25,000 Negroes necessary to take their places. And even unto to-day hundreds of them are laboring in some one of the 169 schools of secondary and higher education maintained for the freed people.

In the inauguration and development of the educational work in the Southern States and the District of Columbia there have been other potential agencies than those already enumerated. It has been shown that the Federal Government, operating through the Freedman's Bureau, of which Major-General O. O. Howard was commissioner, between 1865 and 1870 established 4,239 schools, employing 9,307 teachers, with an enrolment of 247,333 pupils, at a total expense of $1,002,896.07, of which the freedmen themselves raised $200,000; that the American Missionary Association, founded in 1846, was among the first agencies to enter the southern educational work, as it has since been the most active and effective; and that the Southern States, from 1870, when they assumed control of the common school system, to 1896–7, spent in primary education, $514,922,268, of which at least $100,000,000 was devoted to the free education of the slaves. These enormous expenditures were largely supplemented by private benevolence, estimated at a total of $40,000,000, much of which went into primary school buildings and education, the buildings in most instances having been gradually relinquished to the States.

As the American Missionary Association was among the first to enter the southern school work, it is proper to give it a conspicuous place in this monograph. The extent of its operations in the southern field can be inferred from the 53d annual report of the executive committee. From this report it appears that the association has in the southern educational work of secondary and higher education 5 chartered institutions, 45 normal and graded schools, 26 common schools, being 76 schools, with 414 instructors and 12,428 pupils. The receipts for the current work for the year were $297,681.98; expenditures, $296,810.84. The total receipts for all purposes for the year were $370,963.44, of which $71,960.50 is credited to income from the Daniel Hand fund. The work of this association has been inestimable.

At the annual meeting of the American Missionary Association, at Providence, R. I., October 1888, it was announced that Daniel Hand, of Guilford, Conn., had given the association $1,000,894.25, in trust, to be known as the "Daniel Hand educational fund for colored people," the income of which shall be used for the purpose of educating needy and indigent colored people of African descent, residing, or who may hereafter reside, in the recent slave States of the United States." In addition to this princely gift Mr. Hand provided that his residuary estate, amounting to the sum of $500,000, should be devoted to the same purpose, to be disbursed through the association. Mr. Hand made his wealth in the South, where he settled in Augusta, Ga., in 1818, and he, therefore, had an intimate knowledge of the educational needs of the emancipated people. He was a man of devout nature.

But the fund which had the most influence upon the development of the primary and secondary education of the Southern States was that of $2,000,000 established by George Peabody, of Danvers, Mass. (the first gift of $1,000,000 being made 7 Feb. 1867, the second $1,000,000 being added 1 July 1869). In addition, $1,100,000 in bonds, endorsed by Mississippi, and $384,000 Florida bonds were given to the trustees appointed to administer the trust, but these bonds were ultimately repudiated by Mississippi and Florida, although both of them were beneficiaries of the trust,— Mississippi by $86,878 and Florida by $67,375, from 1868 to 1897. The general purposes of the trust, as Mr. Peabody stated it, in his letter to the 16 trustees designated by him, were that "the income thereof should be applied in your discretion for the promotion and encouragement of intellectual, moral or industrial education of the young of the more destitute portions of the southern and southwestern States of our union; my purpose being that the benefits intended shall be distributed among the entire population, without other distinction than their needs and the opportunities of usefulness to them."

The trustees of the Peabody fund, of which the Hon. Robert C. Winthrop was chairman, were particularly fortunate in securing as the first general agent Dr. B. Sears, then president of Brown University. Dr. Sears died 6 July 1880, and was succeeded 2 Feb. 1881, by Dr. Curry,— a southern man,— learned, eloquent, an indefatigable worker, and passionately devoted to the highest educational ideas and to the cause of southern education. As the representative of the Peabody fund and the Slater fund, he has done quite as much as Dr. Ruffner and Dr. Sears in shaping the southern educational movement.

From 1868 to 1897 the income of the fund amounted to $2,478,527.13, of which $248,562.25 was expended in maintaining the Normal College for whites at Nashville, Tenn., and $398,690.88 for scholarships at the same college. The remainder was expended in rendering aid to the needy public schools of the South and in stimulating normal and industrial education for both races.

In March 1882, John Fox Slater, of Norwich, Conn., created a trust fund of $1,000,000, stating that the "general object which I desire to have exclusively pursued is the uplifting of the lately emancipated population of the Southern States and their posterity by conferring on them the blessings of Christian education." He declared in the same relation: "The disabilities formerly suffered by these people and their singular patience and fidelity in the great crisis of the nation, establish a just claim on the sympathy and good will of humane and patriotic men. I cannot but feel the compassion that is due in view of their prevailing ignorance which exists by no fault of theirs."

"But it is not only for their own sakes," Mr. Slater said further, "but also for the safety of our common country, in which they have been invested with equal political rights, and I am desirous to aid in providing them with the means of such education as shall tend to make them good men and good citizens — education in which the instruction of the mind in the common branches of secular learning shall be associated with training in just notions of duty toward God and man in the light of the Holy Scriptures."

The fund is administered by a trustee board, and like the Peabody fund, composed of some of the most distinguished citizens of the republic. The Slater fund is used almost exclusively at the present time in promoting industrial education at a number of the largest institutions for colored people.

These princely donations by three private citizens, aggregating a fund of $4,000,000, have been supplemented by millions of dollars more from private citizens which have gone to the building up of the educational waste places of the South, to which all of the great church denominations have contributed, and still contribute, more or less as organized bodies. As the outgrowth of the benefactions and effort since 1865 there are now, according to Dr. Mayo, 169 schools of secondary and higher education in the Southern States maintained for the Negro people. They are fed constantly by the common schools. and all the agencies working together are fast reducing the ignorance bequeathed as a terrible legacy by the slave system to the Southern States. We shall search history in vain for a parallel to the munificence, the Christian charity and the personal sacrifice which the people of the great republic have contributed since 1865 to the education of the lately enslaved people of the Negro race.

It was natural and to have been expected, after the New England men and women who had graduated out of the white heat of the high educational enthusiasm created by Horace Mann, Henry Barnard, Dr. Sears, and others, from 1830 to 1860, had laid the foundation of the primary education among the emancipated people of the Southern States, that they would then turn their attention to the secondary and higher education of the same people. As fast as they prepared young men and women to take their places as school teachers (and at the present time there are more than 25,000 such teaching in the public schools of the South), these New England men and women retired from the field as public school teachers. They were actuated almost wholly by Christian missionary spirit.

But there was another and a splendid work for them to do in laying the foundation of the secondary and higher education as the necessary supplement of the primary educational work. At the present time there are 169 such schools in the 16 Southern States and the District of Columbia. Some of them are magnificent seats of learning; such, for example, as Howard University, at Washington; Atlanta University, at Atlanta; Fisk University, at Nashville; Wiley University, at Marshall, Texas, and the like, so that the Southern State which has no such school of higher learning is poor indeed. And these schools were founded, for the most part, and are maintained in the main by northern philanthropy — a philanthropy of which George Peabody, John F. Slater and Daniel Hand are the most striking examples. The fact that the income of these 169 schools in 1896–7 was $1,045,289, that $540,097 of it was derived from unclassified sources, that the several States and municipalities contributed $271,839, and that the students paid in tuition fees $141,262, shows that all the best forces of the republic — the State, the Christian philanthropist and the grateful beneficiary — are all working harmoniously together to prepare the children of the former slaves for the proper and high duties of citizenship. The public school system.— with 1,460,084 pupils enrolled of Negroes, in 1896–7, as against an enrolment of only 571,506 in 1876–7,— is a fixture and serves as a constant feeder of the 169 schools of higher learning. Thus the whole system, it will be seen, of primary, secondary and higher education, is in harmonious relationship and must grow stronger every year.

It should not be overlooked, however, that besides the splendid advantages offered the Negroes by these 169 schools of higher learning, all of the colleges and universities of the Northern and Western States are accessible to Negro students who prefer them, color distinctions not being recognized or tolerated in the management of these schools. The white colleges and universities of the Southern States, like the public school system, are conducted rigidly upon lines of race separation.

It was a natural development of the educational effort in the Southern States that when the schools of secondary and higher education

had become fixed facts a desire should have grown up for other institutions whose principal object should be the industrial education of such of the Negroes as desire that sort of education. Of late years industrial schools have sprung up all over the Southern States, and they are growing constantly in favor with the masses, because of their economic condition and the growing demand for skilled workmen in all avenues of industry. In the early days of the educational work of the Southern States little stress was laid upon the industrial training of the people. Mental and moral and religious training was considered the all-important thing. Perhaps it was, — to a people who had dwelt in mental, moral and religious darkness from 1620 to 1865. They needed the great light of mental, moral and religious truths as a firm and sure foundation upon which was to be built a structure of technical education, out of which should naturally grow the industrial and commercial rehabilitation of the people, without which there can be no character, no strength, no prosperity in an individual or a race. This principle was recognized by the 30 members of the Society of Friends, who established the Institute for Colored Youth at Philadelphia in 1837.

The Friends were very much in advance of their time, and a great many good people of both races have not caught up with their idea as yet. However, there has been a very great and satisfactory awakening all over the republic during the past decade, among all races of the population, as to the vital importance of technical education. The fact that 13,581 Negro students were receiving industrial training in schools of the South, in 1897, speaks volumes, as compared to the 2,108 who were receiving collegiate education, and the 2,410 who were receiving classical instruction, and the 1,311 who were taking the professional course in the same year; making a total of 5,829 taking the higher education, or 7,752 fewer than were taking the industrial course. Indeed, the growth of the industrial theory of education among Negroes in the past decade has not only been phenomenal, but it is by all odds the most encouraging fact in a situation not without its discouraging features.

It is a rare compliment to one of the wisest and best of the New England men who engaged in the southern educational work that his theory of industrial training has taken such a firm root in a rich soil. This good and wise man was General Samuel Chapman Armstrong. While other men and women were devoting themselves to the necessary work of founding schools of secondary and higher education for the freed people, General Armstrong in 1868 busied himself in founding and developing the Hampton Normal and Agricultural Institute at Hampton, Va., which, says the historian of the work, "beginning in 1868 with two teachers and 15 students in the old barracks left by the Civil War, the Hampton school has grown, until at the beginning of 1899 there were 1,000 students. Of these 135 are Indians, representing 10 States and Territories. Of the 80 officers, teachers and assistants, about one half are in the industrial departments. Instead of the old barracks there are now 55 buildings."

The Hampton Normal and Agricultural Institute is without doubt at the present time the centre of all that is best, wisest and most permanent in the educational development of the black man in the South. It is by far the largest and most important seat of learning in the country for the development of the Negro. It has a large property now valued at over $500,000 and has in constant operation all the industries by which the colored people find it necessary to make a living. Under wise supervision this institution is constantly growing, broadening and deepening its influence among the people. The work of the Hampton Institute has not only resulted in turning the attention of the Negro population to the importance of industrial education, but has had a marked influence in shaping the education of the white South in the same direction.

Out of the Hampton Institute grew the Tuskegee Normal and Industrial Institute, located at Tuskegee, Ala., in the black belt of the South. The Tuskegee Institute has grown from a log cabin to an institution possessing at the present time (1904) 62 buildings with 2,325 acres of land, 151 instructors and over 1,500 students. It gives instruction in about 36 different industries, in addition to giving training in academic and religious branches. A large number of graduates of Tuskegee are turned out every year and are at work in various portions of the South as teachers in class rooms, instructors in agricultural, mechanical and domestic pursuits. Quite a number of these graduates and students cultivate their own farms or man their own industrial establishments. The property owned by the Tuskegee Normal and Industrial Institute is valued at $700,000, and the buildings have been very largely built by the labor of the students themselves. One rather unique feature of the Tuskegee Normal and Industrial Institute is that the institution is wholly officered by members of the Negro race. Aside from Hampton, Tuskegee is one of the largest and most important centres of education in the South, especially in the direction of industrial development.

The work of the Hampton Institute and Tuskegee is not only proving itself valuable in showing the rank and file of the colored people how to lift themselves up, but it is equally important in winning the friendship and co-operation of the southern white people. The influence of the young men and women turned out from these two institutions, as well as from other institutions, is gradually softening the prejudice against the education of the Negro, and in many striking instances bringing about the active co-operation and help of the southern white man in the direction of elevating the Negro to a higher plane of living.

There have been many other schools than the Tuskegee Institute founded on the Hampton idea, and the number is increasing every year. Nearly all the Southern States are now maintaining industrial schools not only for the blacks but for the whites as well, for the education that is good and necessary for the black is equally so for the white boy.

From these facts and conclusions set forth, hastily withal, it will readily be seen that from the educational point of view the Negro race has, since 1865, taken full advantage of its splendid opportunities, and that the present

affords splendid promise that the future, which so many dread, will, in the providence of God, take care of itself. BOOKER T. WASHINGTON,
President Tuskegee Institute.

Negro Exodus, in American history, a term applied to the emigration of southern negroes to the West and Southwest in 1879 and 1880. During these years upward of 50,000 negroes, men, women, and children, moved to Kansas, and as many more were scattered among the other Western States. So many of the emigrants were penniless and destitute that a Freedmen's Relief Association was organized among the citizens of Kansas. The movement proved so disastrous that emigration ceased at the close of 1880. The negroes undoubtedly removed to the West to better their condition, but the charge was openly made that the movement originated with the Republican party, in order to ensure the election of Republican presidential electors in doubtful States.

Negro Free State. See LIBERIA.

Negro in America, The. In 1900 there were in the United States and its dependencies, 8,840,789 persons of negro descent. They were descendants of the slaves brought from Africa to America in the 15th, 16th, 17th, 18th, and 19th centuries. The demand for workmen in the mines and on the plantations of the Spanish West Indies was the primary incentive for opening the African slave trade to America. A small European slave trade from Africa had begun with the voyage of the Portuguese sailor, Antonio Gonzales, to the River of Gold in 1442. This stream was soon turned toward America when the Indians failed as workmen and the trade was encouraged by King Ferdinand and the Emperor Charles V. The Bull of Demarcation having debarred Spain from African possessions, she was compelled to secure her slaves through contract with the Portuguese and later with other trading nations. This contract for supplying the Spanish Indies with negroes became to be a great commercial prize and the zeal with which the Portuguese, Dutch, and English successively filled these contracts was the main means of transplanting this race.

Early Immigration.— The exact number of negroes brought to America will of course never be known. Dunbar estimates that nearly 900,000 came to America in the 16th century, 2,750,000 in the 17th, 7,000,000 in the 18th, and over 4,000,000 in the 19th, less than 15,000,000 in all. In the limits of the United States, the growth of the black population has been steady and has even since the cessation of the slave trade far outstripped that of any other of the original groups of Americans. In colonial times the slaves went mainly to the West Indies, and, although a few landed in Virginia as early as 1619, they were not brought to the continent in large numbers until England secured the Spanish contract in 1713. At that time there were perhaps 50,000 negroes in continental America; by 1727 this had reached 75,000, and the subsequent increase is estimated by Bancroft as follows:

1750	220,000
1754	260,000
1760	310,000
1770	462,000
1780	462,000

Exact statistics as given by the census reports beginning in 1790 show the following figures:

DATE	Total negroes	Per cent of increase	Per cent of increase of whites	Per cent of total population
1790.....	757,208	.....	.....	19.27
1800.....	1,002,037	32.33	35.76	18.88
1810.....	1,377,808	37.50	36.12	19.03
1820.....	1,771,656	28.59	34.12	18.39
1830.....	2,328,642	31.44	34.03	18.10
1840.....	2,873,648	23.40	34.72	16.84
1850.....	3,638,808	26.63	37.74	15.69
1860.....	4,441,830	22.07	37.69	14.13
1870.....	4,880,009	9.86	24.76	12.66
1880.....	6,580,793	34.85	29.22	13.12
1890.....	7,488,789	13.79	26.68	11.93
1900.....	8,840,789	18.1	21.4	11.6

The census of 1870 was defective and probably that of 1890, also, which would explain the chief irregularities in the rate of increase of negroes. The higher rate of increase of the whites is due to the large immigration.

History.— The history of the negro in America up until 1863 is largely the history of slavery (q.v.). And yet he was not altogether the passive victim of the system. In the earlier days, the tendency was to recognize him as a kind of feudal serf not essentially different from the white serfs. Consequently, when freed, the free black had in many cases the right to vote and intermarried with the white servant class. Gradually, however, a color caste arose which condemned a person of negro descent to civil and legal inferiority, no matter whether he was technically a slave or not. The negroes did not submit to slavery or caste restrictions wholly without a struggle. Before 1850, while the fire of African freedom still burned in the veins of the slaves, there was in all leadership or attempted leadership but the one motive of revolt and revenge,— typified in the terrible Maroons, the Danish blacks, and Cato of Stono, and veiling all the Americas in fear of insurrection. The liberalizing tendencies of the latter half of the 18th century brought, along with kindlier relations between black and white, thoughts of ultimate adjustment and assimilation. Such aspiration was especially voiced in the earnest songs of Phillis, in the martyrdom of Attucks, the fighting of Salem and Poor at Bunker Hill, the intellectual accomplishments of Banneker and Derham, and the political demands of the Cuffes. Stern financial and social stress after the Revolutionary War cooled much of the previous humanitarian ardor. The disappointment and impatience of the negroes at the persistence of slavery and serfdom voiced itself in two movements. The slaves in the South, aroused undoubtedly by vague rumors of the Haitian revolt, made three considerable attempts at insurrection,— in 1800 under Gabriel in Virginia, in 1822 under Vesey in Carolina, and in 1831 again in Virginia under Nat Turner. In the free States, on the other hand, a new and curious attempt at self-development was made. In Philadelphia and New York color-proscription led to a withdrawal of negro communicants from white churches and the formation of a peculiar socio-religious institution among the negroes known as the African Church,— an organiza-

tion still living and controlling in its various branches over a million of men.

Walker's wild appeal against the trend of the times showed how the world was changing after the coming of the cotton-gin. In 1830, slavery seemed hopelessly fastened on the South, and the slaves thoroughly cowed into submission. The free negroes of the North, inspired by the mulatto immigrants from the West Indies, began to change the basis of their demands; they recognized the slavery of slaves, but insisted that they themselves were freemen, and sought assimilation and amalgamation with the nation on the same terms with other men. Thus, Forten and Purvis of Philadelphia, Shad of Wilmington, Du Bois of New Haven, Barbadoes of Boston, and others strove singly and together as men, they said, not as slaves; as "people of color," not as "negroes." The trend of the times, however, refused them recognition save in individual and exceptional cases, considered them as one with all the despised blacks, and they soon found themselves striving to keep even rights they formerly had of voting and working and moving as freemen. On the other hand it was impossible to suppress wholly the upward struggles of the free negro or even of the exceptionally gifted slaves. When the war with England broke out, negroes fought in the ranks; they helped man the victorious ships in the struggle of 1812, and finally in the Civil War turned the scale of victory for the North at a critical point. The number of free negroes was as follows:

1790	59,466
1800	108,435
1810	186,446
1820	233,634
1830	319,599
1840	386,293
1850	434,495
1860	448,070
1870	4,880,009

Barred out of the labor market by slavery on the one hand and color prejudice on the other, these negroes were in a desperate condition; and even in the free States "black laws" curtailed their civil rights. Nevertheless they struggled bravely. In 1830, they held their first national convention in Philadelphia, and began to agitate for civil rights and education, and to discuss schemes of migration to Canada and elsewhere. As the abolition movement grew it received substantial aid from free negroes; it was in a negro church in Boston that the American Anti-Slavery Society was formed, and the first subscribers to Garrison's 'Liberator' came from a Philadelphia negro, James Forten. Led by Remond, Nell, Wells-Brown, and Douglass, a new period of self-assertion and self-development dawned. To be sure, ultimate freedom and assimilation was the ideal before the leaders, but the assertion of the manhood rights of the negro by himself was the main reliance, and John Brown's raid was the extreme of its logic. After the war and emancipation, the great form of Frederick Douglass, the greatest of American negro leaders, still led the host. Self-assertion, especially in political lines, was the main programme, and behind Douglass came Elliot, Bruce, and Langston, and the Reconstruction politicians, and, less conspicuous but of great social significance, Alexander Crummell and Bishop Daniel Payne.

Civil Rights.— As a slave, the negro could be (1) sold or given away by his legal owners, (2) seized for debt, (3) separated from his family, (4) could own no property, (5) had no right to vote, (6) could not hold office, (7) nor could he testify in a court of law save in suits for his own freedom. (8) He could not legally marry, (9) nor trade or make contracts. (10) He could not move about without permission, (11) could be punished corporally and even killed by the master in some cases, and (12) was not permitted to learn to read and write. Being thus legally deprived of all essential rights of manhood, he was utterly defenseless before the aggressions of the unscrupulous even in matters of life and limb. Free negroes in slave States like Virginia and North Carolina were disfranchised early in the 18th century; later their right to testify in courts was taken away, then the right to hold any office, and finally legal pressure was brought to bear in the shape of vagrancy laws and curtailment of economic freedom so as to force them into slavery or drive them from the State.

The free negroes of the North were very generally subject to codes of "Black Laws" which varied from State to State. Those of Ohio as adopted and amended in 1804, 1807, 1824, and later, prohibited negroes from settling in the State unless they could show a certificate of freedom and give bonds guaranteeing good behavior and self-support; a negro was disqualified from testifying in court trials where a white person was a party or to serve as a juryman in any case; his children were excluded from the public school; finally he could not vote. Some States had less rigorous laws and tended to alleviate the position of the blacks; others tended toward greater restrictions.

When the Civil War came despite disclaimer and compromise, the negro was the central issue. The first pressing question was the treatment of fugitive slaves; Butler confiscated them as "contraband of war," Fremont sought to free all slaves, and Halleck sought to catch and return them. Finally beginning at Port Royal, S. C., under Pierce and extending to Fortress Monroe, New Orleans, Vicksburg, Cairo and wherever these fugitives were massed, there grew up systems of controlled negro labor under the guardianship of government officials. General Banks, for instance, had 90,000 ex-slaves under him in Louisiana, with 50,000 laborers under his guidance and an annual budget of $100,000. He made out 4,000 pay rolls a year, registered the freedmen, inquired into and redressed all grievances, laid and collected taxes, and established a public school system. Colonel Eaton in Tennessee, General Saxton in South Carolina, and others had similar work in charge.

Meantime missionary and freedmen's aid societies began sending money, clothes, and teachers south, and there was a demand that the government take hold of this work, unify it and help make easier the transition of 4,000,000 persons from slavery to freedom. This was the genesis of the Freedmen's bureau. This "Bureau of Refugees, Freedmen and Abandoned Lands" was established as a part of the War Department by the Act of 1865 and was modified and extended by the Act of 1866; the larger part of its functions ceased in 1869. General O. O. Howard conducted this bureau and "scarcely any subject that has been legislated upon in civil society failed at one time or an-

other to demand the action of this singular bureau." The Bureau had in its period of greatest activity 900 officials scattered from Washington to Texas. Their work included (1) the relief of physical suffering caused by the war; (2) the overseeing of the beginnings of free labor; (3) the buying and selling of land for the freedmen; (4) the establishment of schools; (5) the payment of bounty money to negro soldiers; (6) the administration of justice between white and black in the Bureau courts.

The Bureau distributed 21,000,000 free rations in fifty months, treated 500,000 patients in 60 hospitals and asylums, transported 30,000 fugitives back to the plantations, and made many thousands of contracts for the new free laborer. Little was done in the matter of furnishing the freedmen with land as the confiscated plantations were restored under the amnesty measures; but aided by the "carpet-bag" governments and the missionary societies a system of common schools and higher institutions was founded and nearly six millions spent on it. The Bureau courts were not successful and the general attitude of the whites was bitterly hostile to the institution. Such was the work of the Freedmen's Bureau. To sum it up in brief, we may say: it set going a system of free labor; it established the black peasant proprietor, it secured the recognition of black freemen before courts of law; it helped to found the free public school in the South. On the other hand, it failed to establish good will between ex-masters and freedmen; to guard its work wholly from paternalistic methods that discouraged self-reliance; to make negroes landholders in any considerable numbers. Its successes were the result of hard work, supplemented by the aid of philanthropists and the eager striving of black men. Its failures were the result of bad local agents, inherent difficulties of the work, and national neglect. The Freedmen's Bureau expired by limitation in 1869, save its educational and bounty departments. The educational work came to an end in 1872, and General Howard's connection with the Bureau ceased at that time. The work of paying bounties was transferred to the adjutant-general's office, where it was continued three or four years longer.

The Freedmen's Bureau really ended in the 14th and 15th amendments to the Constitution (1868 and 1870) giving negroes the right of suffrage. The last efforts of Charles Sumner were given to the Civil Rights Act of 1875, which forbade the exclusion of negroes from public conveniences and places of entertainment on account of color. This was afterward declared an interference with the rights of the States by the Supreme Court, and therefore unconstitutional. The matter of civil rights of negroes is therefore to-day left to the States and has resulted in widespread discrimination in the former slave States. Whites and negroes are separated in schools, railway trains, hospitals, jails, and graveyards by law, and by custom in hotels, theatres, lectures, libraries and churches, and often in street cars and elevators. Beside this there is a tendency to limit all economic and social intercourse to the barest amount necessary among neighbors. Intermarriage is forbidden and the concubinage of black women though decreasing is still considerable; and while it is very difficult to secure the punishment of a white man who violates a black woman, the black man who is even accused of rape against a white woman is usually lynched before he has had a legal trial. These separating laws and centrifugal tendencies have gone beyond reason, and the better thought of the South realizes it. In the future it is probable that lynching will cease, and kindlier intercourse be cultivated.

Political Rights.— Free negroes voted in many of the colonies in early times when otherwise qualified, but later the privilege was taken away as in Virginia in 1723. In the free States they continued to vote, but later were restricted sometimes by special qualifications, as in New York in 1821, or by limiting of the suffrage to whites, as in Pennsylvania in 1838. The 14th amendment to the United States Constitution sought to penalize States which reduced the electorate, and the 15th amendment made discrimination on account of race and color in the qualification of voters illegal. These enactments were made necessary by the opposition of the South to the Freedmen's Bureau and the evident determination of the southern legislatures to re-enslave the freedmen to all intents and purposes by civil restrictions, vagrancy laws, and special legislation. The result of the amendments was to throw the government of the southern States largely in the hands of the freedmen during the years 1866–76. So sudden increase of the electorate in any community would mean a period of disturbance and difficulty, but with honest leadership the outcome might have been different. As it was, dishonest and self-seeking politicians from both North and South sought to use the ignorant negro voters for their own ends, and much extravagance and some misgovernment ensued. Nevertheless it has been truly said of these negro governments:

> They obeyed the Constitution of the United States, and annulled the bonds of States, counties, and cities, which had been issued to carry on the war of rebellion and maintain armies in the field against the Union. They instituted a public school system in a realm where public schools had been unknown. They opened the ballot box and jury box to thousands of white men who had been debarred from them by a lack of earthly possessions. They introduced home rule into the South. They abolished the whipping post, the branding iron, the stocks and other barbarous forms of punishment which had up to that time prevailed. They reduced capital felonies from about twenty to two or three. In an age of extravagance they were extravagant in the sums appropriated for public works. In all of that time no man's rights of person were invaded under the forms of law. Every Democrat's life, home, fireside and business were safe. No man obstructed any white man's way to the ballot box, interfered with his freedom of speech or boycotted him on account of his political faith.

And a negro legislator of that period in South Carolina said in defense of his race that the men who criticised the extravagance of the period between 1869 and 1873 failed to mention

> Those imperishable gifts bestowed upon South Carolina between 1873 and 1876 by negro legislators — the laws relative to finance, the building of penal and charitable institutions, and, greatest of all, the establishment of the public school system. Starting as infants in legislation in 1869, many wise measures were not thought of, many injudicious acts were passed. But in the administration of affairs for the next four years, having learned by experience the result of bad acts, we immediately passed reformatory laws touching every department of state, county, municipal and town governments. These enactments are today upon the statute books of South Carolina. They stand as living witnesses of the negro's fitness to vote and legislate upon the rights of mankind.

Nevertheless, by force and fraud the negro governments were overthrown about 1876, and from that time until the present the negro has been disfranchised either by physical compulsion or cheating at the polls or ingenious legislation. The effects of these methods were so unfortunate that there arose in the South about 1890 a movement to deprive the negro of his vote by legal enactment. This has been practically accomplished now in Mississippi, Louisiana, South Carolina, North Carolina, Alabama, and Virginia, and movements in that direction have been started in other States. The avowed objects of these constitutional amendments have been (*a*) To disfranchise no white voter; (*b*) To disfranchise as many negroes as possible. This has been accomplished by the following measures:

1. *Illiteracy.*— The voter must be able to read and write. (This discriminates against negroes because the negro public school system in the South is much poorer than that of the whites.)
2. *Property.*— The voter must own not less than $300 worth of taxable property and pay taxes on it. (This of course discriminates against a poverty-stricken race of freedmen who could not legally hold property prior to 1863, and who to-day suffer in economic competition by reason of their color and training.)
3. *Poll Tax.*— A voter must have paid his poll tax. (This is a source of discrimination only when it extends back for several years as in Virginia.)
4. *Occupation.*— A voter must have a regular occupation. (This is designed to shut out negro laborers, and is a source of discrimination because of the difficulty of proving its truth.)
5. *Army Service.*— Soldiers or their descendants may vote. (Thoroughly vicious like the preceding.)
6. *Character.*—Persons of "good character" who "understand the duties of citizenship may vote." (This is a source of much discrimination and puts too much power in the hands of registrars.)
7. *"Grandfather" Clause.*— Persons who could vote 1 Jan. 1867 or their descendants may vote if registered within a limited time. (This is a thoroughly vicious attempt to admit ignorant white voters when the same class of blacks are barred.)
8. *"Understanding" Clause.*— Persons may vote who "understand" a clause of the Constitution and can explain it when read to them. (Another indefensible provision designed to shut out blacks arbitrarily by placing large powers of discretion in the hands of local registrars.)

Thus far States have adopted the above qualifications as follows:

Mississippi.— The literacy (1) qualification *or* the "understanding" clause (8) together with the poll tax (3) provision.

Alabama.— The army service (5) and character (6) clauses for persons registering prior to 1903; thereafter the literacy clause (1) and occupation clause (4), *or* the property qualification (2).

South Carolina.— For those registering before 1898, the literacy clause (1) except that writing is not required, *or* the understanding clause (8); after 1898 the literacy (1) *or* property (2) qualifications.

Louisiana.— Literacy (1) *or* property (2) clauses, in addition to the "grandfather" clause (7) which originated here.

North Carolina.— Literacy (1) *and* Poll tax (3) provisions, and "grandfather" clause.

Virginia.— For those registering before 1904, army service (5) *or* Property clauses (2); or literacy (1) *and* understanding clauses (8). After 1904, poll tax clause (3) providing the tax has been paid for three years, and literacy clause (1). Army service (5) excuses from the poll tax (3).

Other Southern States will probably adopt some of these expedients. Just what the ultimate results of these enactments will be is questionable. Probably the more flagrant provisions are unconstitutional and will be declared so eventually. If the negroes progress in the future as hitherto they cannot permanently be deprived of the suffrage.

Economic Status.— The occupations of negroes according to the census of 1890 were as follows:

Per cent of total negroes in gainful occupations 41.1 per cent.

	Total per cent	Male per cent	Female per cent
Professions	1.1	0.2	0.9
Agriculture	57.2	63.4	44.0
Trade and transportation	4.7	6.8	0.2
Manufacture	5.6	7.0	2.8
Domestic and personal service.	31.4	21.6	52.1

This shows that most of the freedmen's sons are farmers and servants as one would expect. Of 1,410,769 negro heads of families in 1890 264,288, or 18.89 per cent of all, owned the homes or farms they lived in; the corresponding figures for the American whites are 51.48 per cent; for Russian- and Polish-Americans 31.38 per cent; for Italians in America 14.51 per cent. In the larger cities (50,000 or more) 9.14 per cent of the negroes owned their homes. In 1900 the per cent of negro owners had risen to 21.8 per cent of all negro families, or 372,414. If we consider particularly negro farmers we find that in the country districts of the South emancipation has been but partial, and that the negro serf is still bound to the soil by peonage, plantation stores and a system of crop mortgages. Nevertheless negro farmers starting with almost nothing a generation ago own to-day 25.2 per cent of all the farms they cultivate, or 188,072 farms out of 746,717 farms, with a total acreage of over 12,000,000, and farm property worth nearly $250,000,000. The total value of the farm property owned and leased by negroes was in 1900, $499,943,734, of which $324,244,397 was represented by the land, $71,903,315 by the buildings, $18,859,757 by the farming tools, and $84,936,265 by the live stock. The average negro farm is worth $669 and contains 51.2 acres. Seventy per cent of the negro farms report cotton as the chief crop; these farms raise 4 million bales of cotton, 24 million pounds of rice, 9 million bushels of sweet potatoes, 88 million pounds of tobacco and 100 million bushels of corn.

Beside these independent farmers there are a vast number of negro laborers, who raise the crops on the farms of the white farmers. There were the following negroes in the designated trades in 1890:

Carpenters	22,318
Barbers	17,480
Saw-mill operatives	17,230
Miners	15,809
Tobacco factory employees	15,004
Blacksmiths	10,762
Brick-makers	10,521
Masons	9,647
Engineers and firemen	7,662
Dressmakers	7,479
Iron and steel workers	5,790
Shoemakers	5,065
Mill and factory operatives	5,050
Painters	4,396
Plasterers	4,006
Quarrymen	3,198
Coopers	2,648
Butchers	2,510
Wood-workers	1,375
Tailors	1,280
Stone cutters	1,279
Leather-curriers	1,099

There were in the United States in 1890 about 175,000 negro skilled artisans in the main classes enumerated above.

In trade negroes are but making a beginning and have about ten millions of dollars invested in small grocery stores, drug-stores, undertaking establishments, newspapers, restaurants, etc. The negroes in professions included in 1890 12,000 clergymen, 400 lawyers, 1,000 government officials, 800 physicians, and 25,000 teachers. The number of those in the civil service and the number of physicians has greatly increased in late years.

Social Condition.— The illiteracy of the negro population 10 years of age and over has decreased as follows:

	Per cent
1870	80
1880	70
1890	57.1
1900	44.5

Of the negro population of voting age (males 21 years and over) 47.4 per cent are illiterate.

Negroes have graduated from college courses as follows:

Number of negro graduates from:

	Negro Colleges	White Colleges
Before '76	137	75
'75–80	143	22
'80–85	250	31
'85–90	413	43
'90–95	465	66
'95–99	475	88
Class unknown	58	64
Total	1,941	390

In the parts of the United States where deaths are regularly registered the death-rate of negroes was 32.4 per 1,000 in 1890, and 30.2 in 1900. The corresponding figures in cities are 33.7 and 31.1. In neither case do these figures apply to those rural districts where the negro population is massed. The record for the dis-

STATISTICS OF NEGRO CHURCHES IN 1890.

Denominations	Organizations	Church edifices	Approximate seating capacity	Halls, etc.	Seating capacity	Value of church property	Communicants or members
Total	23,462	23,770	6,800,035	1,358	114,644	$26,626,448	2,673,977
Denominations	18,835	19,631	5,791,384	940	78,719	20,389,714	2,303,151
Organizations in other denominations	4,627	4,139	1,008,651	418	35,925	6,236,734	370.826

Denominations	Organizations	Church edifices	Approximate seating capacity	Halls, etc.	Seating capacity	Value of church property	Communicants or members
Regular Baptists	12,533	11,987	3,440,970	663	45,570	$9,038,549	1,348,989
Union American Methodist Episcopal	42	35	11,500	7	250	187,600	2,279
African Methodist Episcopal	2,481	4,124	1,160,838	31	2,200	6,468,280	452,725
African Union Methodist Protestant	40	27	7,161	13	1,883	54,440	3,415
African Methodist Episcopal Zion	1,704	1,587	565,577	114	15,520	2,714,128	349,788
Congregational Methodists	9	5	585	4	450	525	319
Colored Methodist Episcopal	1,759	1,653	541,464	64	6,526	1,713,366	129,383
Zion Union Apostolic	32	27	10,100	1	100	15,000	2,346
Evangelist Missionary	11	3	1,050	9	2,650	2,000	951
Cumberland Presbyterians	224	183	52,139	34	3,570	195,826	12,956
Regular Baptists (North)	406	324	92,660	72	7,245	1,087,518	35,221
Regular Baptists (South)	7	5	1,900	2	80	3,875	651
Freewill Baptists	5	3	800	2	200	13,300	271
Primitive Baptists	323	291	96,699	33	1,700	135,427	18,162
Old Two-Seed in the Spirit Predestinarian Baptists	15	4	1,025	11	825	930	265
Roman Catholics	31	27	8,370	3	60	237,400	14,517
Christians (Christian Connection)	63	54	16,495	7	800	23,500	4,989
Congregationalists	85	69	19,360	11	1,925	246,125	6,908
Disciples of Christ	277	183	41,590	75	5,850	176,795	18,578
Lutheran Synodical Conference	5	5	1,050	.....	.....	13,400	211
Lutheran United Synod in the South	5	3	550	2	250	1,750	94
Methodist Episcopal	2,984	2,800	635,252	165	12,925	3,630,093	246,249
Methodist Protestant	54	50	11,545	4	200	35,445	3,183
Independent Methodists	2	2	725	.....	.....	4,675	222
Presbyterians (Northern)	233	200	56,280	21	3,100	391,650	14,961
Presbyterians (Southern)	45	29	6,190	7	565	22,200	1,568
Reformed Presbyterians (Synod)	1	1	300	.....	.....	1,500	76
Protestant Episcopal	49	53	11,885	2	100	192,750	2,977
Reformed Episcopal	37	36	5,975	1	100	18,401	1,723

eases most fatal to negroes is as follows per 100,000 living:

	1890	1900
Consumption	546.11	490.6
Pneumonia	278.97	349.0
Diarrheal diseases	253.84	205.8
Heart disease and dropsy	203.99	216.6
Diseases of nervous system	332.9	294.6

Negroes have a smaller death-rate than the whites in scarlet fever, diphtheria and croup, cancer and tumor and diseases of the liver; about the same death-rate in measles and influenza, and considerably higher in malaria and typhoid fevers, diarrheal diseases, consumption, heart disease, pneumonia and diseases of the nervous system.

There were in the prisons of the nation in 1870, 1,642 negroes for every million of the negro population; in 1880, 2,480, and in 1890, 3,508. The increase of crime among whites in this period was large, but not so large as that among negroes. This negro crime is due to the economic stress following emancipation, to discrimination in the courts in the South, and to the fact that through the convict lease systems of the South crime is a source of profit to the State and consequently little is done to curtail it effectively. There is beginning now a movement toward reformatories for the young in the South. The home life of negroes has greatly improved since emancipation. In the country districts about half the population still live in the one-room cabin which used to be almost universal, one third live in two-room homes, and the rest in homes of three or more rooms. The food has an excess of fats, but is improving. The chastity of the women which was made a by-word under the slave regime has taken great strides, so that even in the back country districts not above 9 per cent of the population may be classed as distinctly lewd; and in the cities and the better rural districts the better class of negro women bear comparison with the white women of any section. There still remains, however, a great work of uplift among the masses. The habitat of the negro population shows many changes in the last generation: First, it is segregating itself in a black belt extending from Carolina to Texas, and centring in the Mississippi bottoms; secondly, it is seeking northern cities; thirdly, it is beginning to move to the cities and towns of the South; 4.2 per cent of the negroes were in cities of 8,000 or more in 1860; 12 per cent in 1890.

Religion.— The statistics of negro churches in 1890 are given in tables on preceding page.

Amalgamation of Blood.— The negroes of America are not of pure negro blood. There has gone on in the country first an intermingling of the various African tribes transported and secondly a large infusion of white blood. The census reports of this latter intermingling are admittedly far below the truth:

1850—	405,751	mulattoes	or	11.2%	of	all negroes.
1860—	588,352	"	"	13.2%	"	"
1870—	585,601	"	"	12. %	"	"
1890—1,132,060		"	"	15.2%	"	"

As a matter of fact, probably a third of the negroes of the United States, or 3 millions, have traces of white blood.

Literature and Art.— The distinctive writings which reflect the life and feeling of American negroes can be found in their works as follows:

1773—Phillis Wheatley: Poems. London.
1793—Richard Allen: Life. Philadelphia, 8vo, 69 pp.
1808—African Society: Essay on Freedom. Boston, 22 pp.
1810—Act of Incorporation, Causes and Motives of the African Episcopal Church. Philadelphia.
1812—Paul Cuffe: Brief Account . . . of Sierra Leone. N. Y., 12 pp.
1829—David Walker: An Appeal, etc. Boston.
1838—Appeal of 40,000 Colored Citizens. Philadelphia.
1852—M. R. Delaney: Condition . . . of the Colored People. Philadelphia. W. C. Nell: Services of Colored Americans in the Wars of 1776, 1812. Boston.
1854—F. E. W. Harper: Miscellaneous Poems. Boston.
1855—Frederick Douglass: My Bondage and Freedom. New York, 464 pp.
1862—William Douglass: Annals of St. Thomas. Philadelphia.
1863—W. W. Brown: The Black Man. New York, 310 pp.
1867—B. T. Tanner: Apology for African Methodism. Philadelphia, 468 pp.
1875—Sojourner Truth: Narrative. Boston, 320 pp.
1878—J. M. Trotter: Music and Some Highly Musical People. Boston, 505 pp.
1881—W. S. Scarborough: First Greek Lessons. New York, 150 pp.
1882—G. W. Williams: History of the Negro Race in America. New York, 1882.
1883—J. M. Langston: Freedom and Citizenship. Washington, 286 pp.
1883—W. Still: Underground Railroad. Philadelphia, 780 pp.
1884—T. T. Fortune: White and Black. New York, 310 pp.
1885—D. A. Payne: Domestic Education. Cincinnati, 184 pp.
1887—W. J. Simmons: Men of Mark.
1890—1900—A. J. Cooper: Voice From the South. Xenia, O., 304 pp. W. H. Crogman: Talks for the Times. Atlanta, 330 pp. A. Grimke: Charles Sumner. New York, 515 pp. P. L. Dunbar: Lyrics of Lowly Life. B. T. Washington: Up from Slavery. C. W. Chesnutt: The Marrow of Tradition. DuBois: Souls of Black Folk.

The one contribution of negroes to art is their plaintive and beautiful folk-songs, many collections of which have been made by Fisk University and Hampton Institute.

Notable Men.— The negro race in America has given birth to many men of more than average ability. Frederick Douglass was an orator who greatly helped the abolition cause; Phillis Wheatley wrote better than most writers of her day; Benjamin Banneker did some work in astronomy and helped lay out the city of Washington; Ira Aldridge gained a European reputation as an actor; George W. Williams wrote the best extant history of the negro in America; Lemuel Haynes, Alexander Crummell and Daniel Payne were clergymen of unimpeachable character and wide influence for good. Blanche K. Bruce was United States senator and register of the treasury.

References.— The history of the negro prior to emancipation will be found in the abundant literature of slavery. Official sources of information are the United States census reports, especially 1850–1900, and the bulletin of the United States Bureau of Labor. Next to these may be placed the serial publications of the American Negro Academy, of the trustees of the Slater Fund and of Atlanta University, and the studies of Johns Hopkins University. The more important single works are Williams' 'History,' Washington's 'Up from Slavery,' Payne's 'A. M. E. Church,' the essays by Cable on the negro question, Chesnutt's 'Marrow of Tradition,' Dunbar's poems, and various articles by Kelly Miller. Much of the more important work is in the periodicals, and may be traced through Poole's 'Index.'

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Negro Melodies. In slavery days the Southern Negroes were noted for their field and cabin songs and dances. Many of their original plantation songs had been handed down from their African ancestors. The tunes while melodious had a range of a few notes, the major key predominating. Following the ancestral melodies came the tunes adapted from Baptist and Methodist hymns. After the war the Negro songs began to disappear and nondescript Afric-European melodies, which eventually developed into ragtime (q.v.) became popular in both the North and South. This change was due to two causes; the desire of the freed slaves to throw aside all remembrances of slavery days, and to the widespread development of modern Negro minstrelsy.

Negro Minstrels, a species of musical entertainment of a quaint and simple kind, which originated among the Negroes of the southern United States, and was first made popular at public entertainments by E. P. Christy, the originator of the troupes of imitation Negro musicians. The words of the songs are generally in broken English, and the harmonies almost entirely limited to the chords of the tonic and dominant. The bones and banjo and tambourine are the chief accompanying instruments, but minstrel troupes are usually accompanied by orchestras. Their entertainments are not now exclusively musical, but may include amusing interludes, dramatic sketches, acrobatic, and similar performances. Among modern Negro minstrels in the United States the names of Haverly, Backus, Kersands, Emerson, Henry, Carncross, and West are familiar to the amusement loving public.

Negro Monkey, the name of several monkeys noted for the blackness of their coats; especially a large long-tailed East Indian and Malayan langur (*Semnopithecus maurus*), which is reddish when young.

Negro Plot, in American history, the name given to a local rebellion in New York city in 1741. On 18 March of that year a fire occurred in the chapel and barracks at Fort George at the Battery. It was generally believed to be accidental, but charges were set afloat that it arose from a plot by the negroes to burn the city. Eight other fires of a mysterious nature within a month strengthened this belief, and later one Mary Burton, a servant, furnished testimony implicating a number of sailors and Negroes. Twenty whites and over 160 Negro slaves were seized and imprisoned. Finally Mary Burton's accusations inculpated persons of such character that danger from that direction checked the investigation. It was charged that the Spanish were inciting plots among the Negroes through Roman Catholic priests. Four whites were hanged, 18 negroes hanged, and 13 burned at the stake.

Negro Population in the United States. The census reports show that in 1790 there were 757,000 colored people in the United States; in 1800 there were 1,002,000; in 1810, 1,378,000; in 1820, 1,772,000; in 1830, 2,329,000; in 1840, 2,874,000; in 1850, 3,639,000; in 1860, 4,442,000; in 1870, 4,880,000; in 1880, 6,581,000; in 1890, 7,470,000; in 1900, 8,840,789. In 1900, in the 11 Southern States which were banded together in the old Secession Confederacy, there were 7,132,617 negroes and 11,776,291 whites. Following are the statistics by States:

	Whites	Negroes
Alabama	1,001,152	827,307
Arkansas	944,580	366,856
Florida	247,333	230,730
Georgia	1,181,294	1,034,813
Louisiana	729,612	650,804
Mississippi	641,200	907,630
North Carolina	1,263,603	624,469
South Carolina	557,807	728,321
Tennessee	1,540,186	480,243
Texas	2,426,669	620,722
Virginia	1,192,855	660,722

Negro (nā'grō) **Rio.** See Rio Negro.

Negro Troops, the negro has proved a valiant soldier in the various American wars. A very few of them were employed in the Revolutionary War. Though a few generals made use of them in the first two years of the Civil War, and Congress authorized their employment at the Sea Islands, the first general provision for their enlistment was made in July 1863. After that they were employed in considerable numbers, and at times with great success. Soon after the Rebellion a Negro regiment, the Ninth Infantry, was organized as a part of the regular army corps and performed valuable service in the West in various engagements with the Indians. The Ninth also was conspicuous for bravery in the Spanish-American War, in the Cuban campaign, and later in the Philippines.

Negropont, nē'grō-pŏnt. See Eubœa.

Negros, nā'grōs, Philippines, an island lying southeast of Panay, west of Cebu, and northwest of Mindanao, bounded on the north by the Visayan Sea, and on the south by the Sulu Sea; length, 134 miles; greatest width, 33 miles; area, 4,839 square miles, with dependent islands 4,854 square miles. It is the fourth island in size of the archipelago.

Topography.— A central mountain range, which divides the island into two almost equal divisions, extends from the extreme northern point to Caladias, only 14 miles from the southern coast; the spurs from this range extending east and west form large valleys. Near the northern end of the range is the Canlaón volcano, also known as Malaspina, 8,192 feet in height; and in the southern summits of the Sierra Dumaguete are two mountain lakes, the larger five miles long, the smaller two miles. A few miles southeast of the larger lake are the hot springs of Mainit, and near the coast near Dáuèn are several sulphur and thermal springs. There are no large rivers, but numerous small streams flowing through the valleys.

Industrial Resources.— The soil is fertile and the vegetable products abundant; they include chocolate of excellent quality, sugar, coffee, rice, tobacco, wheat, cotton, hemp, bago, etc. There are also valuable forests in the interior. Important deposits of coal are found in both eastern and western Negros, and indications of iron in the western part. The most important industry of the island is agriculture; the natives understand methods of irrigation, and use the numerous streams for this purpose; next in importance are the fisheries; turtle shells, sea cucumbers, and sea shells are also gathered. Sugar and sugar sacks are manufactured, hydraulic

machinery being used in the production of the former; in the eastern part of the island cotton pillows are manufactured, which are used on steamers. A wagon road or trail follows the coast, but there are few roads extending far into the interior; there are only two defiles through the mountain range. All the important towns are on the seacoast, and most of the local trade is carried on by water.

People and Government.— The people of the coast are Visayans, and those of the mountains Panayanos; the chief language is Visayan. The island was occupied by United States troops in 1900, and operations were carried on against bands of outlaws and robbers. In 1899 a native constitutional convention was held at Bacólod, and a constitution framed and submitted to the United States authorities, this being the first attempt to institute civil government in the Philippines. A temporary government was proclaimed in July 1899, and in 1901 the Philippine Commission divided the island into two provinces, Negros Occidental (western), and Negros Oriental (eastern), and established civil government similar to that in other provinces. Pop. 372,010; Occidental, 231,512; Oriental, 140,498.

Negruzzi, nā-groot'sē, **Jacob,** Rumanian author, son of Konstantin Negruzzi (q.v.): b. Jassy 11 Jan. 1843. He published his father's complete works; was professor of commercial law at Jassy and after 1885 at Bucharest; founded in 1867 the periodical called 'Convorbiri literare' for which he wrote verse, fiction, and prose idylls; and translated Schiller into Rumanian.

Negruzzi, Konstantin, Rumanian poet and author: b. Jassy 1809; d. there 1866. He studied in Jassy and Bessarabia, edited 'Dacia Literaria' (1840) with Cogalniceanu and Alecsandri, was a leader in the Liberal party and a minister of Count Cusa, and wrote versions of Pushkin, Kantemir, and Hugo; 'The Sins of Youth,' a volume in prose and verse; and the epics 'Aprodul Parice' and 'Lapusneanu.'

Negun'do, a genus of trees represented by the box-elder (q.v.). It was regarded by Gray as a genus of the soapberry family (*Sapindaceæ*), but more recently botanists have classed it with the maples (*Aceraceæ*).

Ne'gus, a beverage made of wine, water, sugar, nutmeg, and lemon-juice; so called from Col. Francis Negus, the inventor, who lived in the time of Queen Anne. Negus is also the native title bestowed upon the sovereign of Abyssinia.

Nehalle'nia, in Scandinavian mythology, a deity who presides over commerce and navigation.

Nehan'tic. See NIANTIC.

Nehantic Indians. See NARRAGANSETT INDIANS.

Nehemiah, nē-hē-mī'a, **Book of,** a part of the canonical scriptures which is thus called from the name of the chief personage mentioned in it. The Book of Ezra (q.v.) is so named from the same reason. Certain parts of the Book of Nehemiah we may suppose to have been written by him, as they are in the first person. This and the Book of Ezra originally formed one work as they still do in the Hebrew canon, though separated in modern Hebrew bibles. They are connected as historical narratives, Nehemiah forming the sequel to Ezra. Ezra arrived in Jerusalem in the 7th year of Artaxerxes, king of Persia, and we hear nothing of his doings, subsequent to the events attending his arrival, until 13 years later Nehemiah appears upon the scene and relates what is written in the present book. He was cupbearer to the king of Persia, and Artaxerxes noticed his sadness, for he was grieving over the condition of his countrymen in Judah. The king therefore gave him leave to return to Jerusalem as governor of the city; he was also furnished with certain materials for re-fortifying it. Then the Samaritans were filled with envy at the favor shown the Jews and the dignity conferred upon Nehemiah. Meanwhile the latter was earnestly pressing on the work of rebuilding the wall, and as the Ammonites and Arabians threatened to interrupt the operations, he armed the builders and in 52 days the walls and towers were completed. The machinations of his enemies kept him constantly on the alert, but safety was at length secured by putting trustworthy men in command of the walls and gates. About a week after the restoration of the fortifications in Jerusalem Ezra is introduced into the narrative as a scribe learned in the law. A great gathering of the tribes is held at which he recites the Law. Priests and Levites assist him by explaining what he reads and such interest is created that the assembly continues its session from morning till noon. The Feast of Tabernacles is afterward celebrated, and the Jews, "the seed of Israel," dedicate themselves once more to a state of separateness from the heathen and to an observance of the ordinances of the Law. Then the walls were solemnly dedicated, and Nehemiah returned to Persia in the 32d year of Artaxerxes. When he subsequently returned to Jerusalem he found that the high priest had polluted the temple by assigning to the associate of the Samaritan governor a room within its precincts. Nehemiah cleared out and purified the chamber and the book closes in the midst of his zealous labors for the protection of pure temple worship. The Book of Nehemiah is a page from the post-exilic history of the Jews, as animated by a revivid interest in and care for the Scriptures and a renewed national life under the ordinances of the Law. Consult Sayce, 'Introduction to Ezra, Nehemiah, and Esther' (1889); Reuss, 'Geschichte der heiligen Schriften des Alten Testaments' (1890).

Neher, nā'hĕr, **Bernhard von,** German painter: b. Biberach, Würtemberg, 16 Jan. 1806; d. Stuttgart 17 Jan. 1886. He received his first instruction in art from Dannecker and Hetsch in Stuttgart, but was more especially indebted to Cornelius, under whose eye he painted in Munich. His student life was completed by a four years' residence in Rome, where he painted 'The Raising of the Widow's Son at Nain,' now in the Public Gallery at Stuttgart. In 1832 he returned to Munich and applied himself to fresco painting and in 1836 was commissioned to decorate two rooms in the castle of the grand duke at Weimar with scenes from the poems of Schiller and Goethe. He became director of the Leipsic Academy of Painting in 1841; professor in the art school at Stuttgart in 1846; and di-

rector of the same in 1854. During his residence in the latter city he executed the large oil painting 'The Taking Down from the Cross,' now in the Stuttgart gallery; 'The Crucifixion' for the church at Ravensburg; and the small painting, 'Spring,' now in the royal palace; 'The Sacrifice of Abraham'; 'Christ Blessing the Little Children'; 'Abraham Receiving the Angels'; and several portraits. He also drew ten large cartoons for reproduction in glass, six in the cathedral, three in the chapel of the ducal palace, and one in Saint Leonard's Chapel in the king's palace at Stuttgart.

Neher, Michael, German painter: b. Munich 31 March 1798; d. there 4 Dec. 1876. For three years he attended the Art Academy of his native place and subsequently worked as an assistant to the court-painter Klotz and the decorator Angelo Quaglio. In 1819 he visited Italy, where he applied himself to architectural landscape. He returned to Munich in 1825 and made a reputation by his paintings of different costumes, his landscapes, views of city squares, and architectural pictures. He also made copies of paintings by Rubens and Schwind for the castle of Hohenschwangau.

Nehlig, nā-lēg, **Victor,** French painter: b. Paris 1830. He came to the United States in 1856, after learning his art under Cogniet and Abel de Pujol, and opened a studio in New York, where he was made a member of the National Academy (1870). Since 1872 he has resided in Paris. He is a very successful painter of history and genre, and among his best known pictures are 'The Bravo' (1870); 'Armorer of the Old Time'; 'Gertrude of Wyoming'; 'The Artist's Dream'; 'The Cavalry Charge of Lieutenant Hidden' (New York Historical Society); 'Battle of Antietam' (William Astor collection); etc.

Neide, nī'dė, **Emil,** German painter: b. Königsberg, East Prussia, 28 Dec. 1843. He was educated at the local art school, but studied also at Düsseldorf and Munich, where he became especially an imitator and follower of Diez. His student travels took him through Belgium, Holland, and northern Italy. He subsequently settled at Königsberg. He had executed before making his tour a fresco in the hall of the local University, 'Ptolemy Observing the Course of the Stars.' On his return to Königsberg he followed this up by a series of mythological paintings, among which the most remarkable were 'Psyche Ferried over the Styx by Charon' (1873, in the Museum at Königsberg); 'Orpheus and Eurydice' (1876, in the Halsey collection, New York); and scenes from the Odyssey, for the Gymnasium at Insterburg. In 1886 he produced two genre pictures which showed a complete change in style, coloring, and handling as well as choice of subject, from what had characterized his work hitherto. These are 'The Scene of the Deed' (the discovery of the corpse of a murdered man); and 'Life-Weariness,' works which have greatly extended the popularity of their author, and have been excelled by none of his subsequent productions. He is professor in the art academy at Königsberg.

Neidhart von Reuenthal, nīt'härt fŏn roi'-ĕn-täl, German poet of the 13th century. A Bavarian and a poor noble by birth he is famous for his peasant lyrics, satiric and unflattering in tone, which created a new style of "court-poetry." Neidhart was a favorite of Frederick the Quarrelsome (after breaking with Leopold VII. of Austria), with whom he went on the Egyptian crusade of 1218–9. He died between 1240 and 1245, heartily hated by the peasants he portrayed, who styled him Neidhart Fuchs. His poems were edited by Haupt (1858).

Neighbor Jackwood, an anti-slavery novel, by J. T. Trowbridge (q.v.), published in 1857. It was written just after the author had seen the fugitive slave, Anthony Burns, returned by the Commonwealth of Massachusetts to his Virginia bondage. Like his juvenile stories, this novel for grown folks is crowded with incident and dialogue,— homely and true to life in part, and in part melodramatic. The story was dramatized and played in Northern theatres with considerable success.

Neilgherry (nēl-gĕr'ē) **Hills.** See NILGIRI HILLS.

Neill, nēl, **Edward Duffield,** American historian and educator: b. Philadelphia 9 Aug. 1823; d. 26 Sept. 1893. He was graduated from Amherst in 1842, and later studied at the Andover Theological Seminary. In 1848, having entered the Presbyterian ministry, he was settled as pastor of the first Protestant church established at Saint Paul, Minn. He served (1851–3) as superintendent of public instruction for that Territory, and as chancellor of the State University, 1858–61. As army and hospital chaplain he served in the Civil War from 1861 to 1864, then till 1869 was an assistant private secretary, first to President Lincoln, and afterward to President Johnson. In 1869 he was for a short time consul at Dublin. He was president of Manchester College, Saint Paul, 1873–84, and professor of history and literature there from the latter year until his death. His books on historical subjects deal chiefly with colonial and pioneer times, and include the 'History of Minnesota' (1858); 'Terra Mariæ,' a history of early Maryland (1867); 'History of the Virginia Company of London' (1869); 'English Colonization of America During the Seventeenth Century' (1871); 'Minnesota Explorers and Pioneers' (1881); 'Virginia Vetusta' (1885); and 'Virginia Carolorum' (1886).

Neillsville, nēlz'vīl, Wis., city, county-seat of Clark County; at the junction of the Black and the O'Neil rivers, and on the Chicago, St. P., M. & O. railroad; about 125 miles northwest of Madison. The surrounding country is largely agricultural, but considerable attention is given to stock-raising. The chief manufactures are flour, lumber, and lumber products. There is considerable trade in lumber, flour, farm products, and live-stock. It has a library of about 3,000 volumes. Pop. (1890) 1,936; (1900) 2,104.

Neilson, nēl'sŏn, **James Beaumont,** Scottish inventor of the hot blast in manufacturing iron: b. Shettleston, near Glasgow, 22 June 1792; d. Queenshill, Kircudbrightshire, 18 Jan. 1865. His father was a millwright, too poor to give his son much education. The latter worked at engines as a boy, acquired a little money by marriage, and in Glasgow at 25 became foreman of the new gas-works, in connection with which he opened a library, reading-room, and lecture

hall for the employees. His experiments with the hot blast date from about 1825; they were contrary to the theory of the ironmasters of the time who saw that the iron was more easily worked and better in winter and so attempted artificial refrigeration. The result, of course, was that no one would let Neilson use his blast furnace for a decisive test for a time. The method introduced (1828) by Neilson is thrice as cheap as the cold blast; hence the patent was constantly infringed and for 15 years he was involved in exhausting law-suits, which, with the exception of the great case against the Bairds of Gartsherrie, who refused to pay license for the hot blast, were mostly unsuccessful.

Neilson, Lilian Adelaide, English actress, whose real name was Elizabeth Ann Brown: b. Leeds 3 March 1848; d. Paris 15 Aug. 1880. She worked in a mill at Guiseley and then as a nurse maid, and, upon learning the story of her birth, ran away from her mother, an actress, and went to London. There she was a bar-maid; gave dramatic recitations from Shakespeare; and made her début in 1865 as Juliet, possibly her best role. She played for several years in London with great success due to her beauty, her girlish grace, splendid voice, and dramatic power; and appeared in New York in 1872, '74 '76, '79, and '80. Joseph Knight says of her: "As a tragedian she had no English rival during the last half of this century." Her roles included Isabella, Julia, Rosalind, Beatrice, Lady Teazle, Amy Robsart in Andrew Halliday's 'Kenilworth,' and Rebecca in Halliday's 'Ivanhoe.'

Neilson, Samuel, Irish politician, leader of the United Irishmen: b. Ballyroney September 1761; d. Poughkeepsie, N. Y., 29 Aug. 1803. After marrying the daughter of a rich merchant he went into the woolen business in Belfast. His part in politics became increasingly engrossing and in 1791 he suggested the organization of the United Irish Society, which was very successful, thanks to Wolf Tone. To assist this enterprise Neilson became editor of the 'Northern Star,' of which he was sole proprietor in 1794, and which was suppressed in 1797 after his arrest for treason. He was released in February 1798, rearrested almost immediately, and was again released in 1802. During these years it is impossible to decide whether he was faithful to his parole to the government or to his oath to his fellow conspirators; but it seems likely he was false to both parties. He came to America in December 1802 and died in the next year. Consult: Madden, 'United Irishmen' (1842–6), and the 'Life' by Dornin (1804).

Neisse, nīs'sė, Germany, a town in the Prussian province of Silesia and the government of Oppeln, on a river of same name, 47 miles by rail southeast of Breslau. It is a place of considerable strength, surrounded by detached forts and other works; has some notable edifices, military and other important schools, and manufactures furniture, blankets, wire-netting, etc. Neisse was anciently the chief town of a principality, and residence of a prince-bishop. It came into the possession of Prussia in 1741, when, after a valiant defense, it was taken by Frederick II. Pop. (1900) 24,271.

Neith, nē'ĭth, or **Neitha,** in Egyptian mythology, a goddess who was worshipped especially as a local divinity in Lower Egypt. By the Greeks she was identified with Athene. She often appears as the companion of Phtha, who, as local divinity of the old capital of Memphis, stood at the head of the pantheon of Lower Egypt; and on that account she is not unfrequently styled the great Mother of the Gods. Like all the great Egyptian goddesses, she was identified with Isis.

Nejd, or Nejed. See NEDJED.

Nek'en, in Scandinavian mythology, the evil spirit of the North, said to have had his home in the Arctic seas.

Nekrassoff, nĕk-rä'sŏf, **Nikolai Alexeievitch,** Russian poet: b. Podolia 4 Dec. 1821; d. St. Petersburg 8 Jan. 1888. He was educated in St. Petersburg, where he left the army for the University against his father's wishes and was disowned by his family. By teaching and writing he made a bare livelihood. In 1847 he succeeded Bielinsky as editor of the 'Contemporary,' which post he kept until 1866; and in 1868 became editor of the 'Annals of the Fatherland,' in which most of his poetry appeared. He bitterly attacked administrative abuse, notably in his long poem, 'Who Lives in Russia Happily?' showing the discontent and the suffering in all classes. His satiric attacks on the bureaucracy should be mentioned and the pathetic and powerful 'Last Songs' (1877).

Nélaton, nā-lā-tôn, **Auguste,** French physician and surgeon: b. 17 June 1807; d. Paris 21 Sept. 1873. He studied medicine at Paris under Dupuytren, and was graduated 1836. Soon after he was appointed hospital surgeon and private lecturer in the faculty of medicine in the University of Paris. In 1851 he was appointed professor of clinical surgery, an office which he held till 1867, when he retired. In 1868 he was raised to the dignity of senator. Nélaton was equally distinguished as a professor and as an operator, and invented "Nélaton's probe," used in military surgery in locating bullets. His chief publication is his 'Eléments de Pathologie chirurgicale' (1844–60; 2d ed. 1868–85), a work of great value, in which several of his pupils took part.

Neleus, nē'lūs, in ancient Greek mythology, a son of Poseidon and twin brother of Pelias. He was exposed, but reared by a shepherd. He refused to purify Hercules after the murder of Iphitus, and Hercules in vengeance killed all his sons but Nestor. It is said that he revived the Olympian games.

Neligh, nē'lĭg, Neb., city, county-seat of Antelope County; on the Elkhorn River, and on the Fremont, E. & M. V. railroad; about 120 miles in direct line northwest of Lincoln, and 130 miles in direct line northwest of Omaha. It is in a fertile agricultural section in which corn and wheat are the chief farm products. Considerable attention is given to raising cattle and hogs. It is the seat of Gates Academy, under the auspices of the Congregational Church. Pop. (1890) 1,209; (1900) 1,135.

Nell Gwynn. See GWYNN, ELEANOR.

Nellore, nĕ-lōr', or **Nellur,** nĕ-loor', India, a town, the capital of a district of Madras, on

the Pennair River, eight miles from its mouth in the Bay of Bengal, and 109 miles by rail northwest of Madras city. Pop. (1901) 32,040. The district of Nellore, area 8,765 square miles, is famous for its breed of cattle. Pop. (1901) 1,497,796.

Nel'son, Aven, American botanist: b. Lee County, Iowa, 24 March 1859. He was graduated from the State Normal School at Kirksville, Mo., in 1883, and since 1887 has been professor of botany in the University of Wyoming. He has published 'The Trees of Wyoming and How to Know Them' (1899); 'Key to the Rocky Mountain Flora' (1902); etc.

Nelson, Cleland Kinloch, American Protestant Episcopal bishop: b. near Cobham, Va., 23 May 1852. He was graduated from St. John's College, Annapolis, Md., in 1872, studied theology at Berkeley Divinity School, Middletown, Conn., and was ordained to the priesthood in 1876. He was rector of the church of St. John the Baptist at Germantown, Philadelphia, 1876–82, and of the Church of the Nativity, South Bethlehem, Pa., 1882–92. In the year last named he was consecrated bishop of Georgia.

Nelson, Edward William, American naturalist: b. Manchester, N. H., 8 May 1855. He was graduated from the Cook County Normal School, Chicago, in 1875. He was engaged in scientific research in Alaska in 1877–81 and was a member of the Arctic expedition on the United States steamer Corwin in her search for the Jeannette in 1881. He accompanied the Death Valley expedition in 1890 and has spent much time in scientific explorations in Mexico. He has published: 'Birds of the Behring Sea and the Arctic Ocean' (1883); 'Squirrels of Mexico and South America' (1899); etc.

Nelson, Henry Loomis, American journalist: b. New York 5 Jan. 1846. After a course at Williams College, he studied law, was admitted to the bar in 1869, was Washington correspondent of the Boston *Post* in 1875–85, and editor of that journal in 1885–6. In 1894–8 he was editor-in-chief of 'Harper's Weekly,' and in 1902 became professor of political science in Williams College. He published: 'Our Unjust Tariff Law' (1884); 'John Rantoul' (1884); 'The Money We Need' (1896).

Nelson, Horatio, 1ST VISCOUNT, English naval officer: b. Burnham-Thorpe, Norfolk, England, 29 Sept. 1758; d. on board the Victory at Trafalgar, 21 Oct. 1805. He entered the English navy at 12 (1770). Three years after he went on an Arctic expedition under Commodore Phipps and on his return (1777) was made a lieutenant. Two years later he was promoted to the rank of post-captain. He was then sent to Nicaragua in command of a man-of-war, and took Fort San Carlos, in the San Juan River. In 1781–2 he made another expedition into the North Sea, but returned to the West Indies in 1782 and, placed in command of the Boreas; he was kept on this duty for five years, accomplishing much good from his vigorous attempts to prevent smuggling between the United States and the British colonies. Nelson's indomitable spirit in insisting upon enforcing the Navigation Acts against all foreign nations brought him into conflict with his commander, Sir Richard Hughes, and made him unpopular in commercial circles; for a long time he was harassed with vexatious law-suits. He was, however, upheld by the British government. It was while on this station that Nelson met and married the widow of Dr. Josiah Nesbit (11 March 1787). Six months after his marriage he returned with his wife to England and was placed upon the retired list. It has been hinted that through jealousy undue influence was brought to bear upon the Admiralty to keep him from active service. At any rate he remained in obscurity until all officers were recalled into active service on the outbreak of the war with the French Republic in 1792.

The year 1793 saw the real beginning of Nelson's career. He had attracted Lord Hood's attention, and at his solicitation was placed in command of the ship Agamemnon, 64 guns, and sent to join Lord Hood in the Mediterranean, where he rendered him valuable assistance at the siege of Bastia (May 1794). He participated in the siege of Calvi and there had the misfortune to lose one of his eyes. While on this station he also served under Hotham and Sir John Jervis. While on a diplomatic mission to Naples in September 1793 he met Lady Emma Hamilton, who was destined to be so closely identified with an important part of his life. In 1796 he was promoted to be commodore and was given a new command. On 25 Sept. 1796 orders came ordering the abandonment of Corsica and the Mediterranean, and Nelson sorrowfully left the field. He was, however, shortly sent back to secure supplies which had been left on the island of Elba, and on returning passed through the whole Spanish fleet which had then joined the common cause of France. On the following day occurred the famous battle of Cape St. Vincent (q.v.), 14 Feb. 1797. For his gallantry and skill in maneuvering his vessel he was made rear-admiral of the blue and appointed to the command of the inner squadron at the blockade of Cadiz. His next service was an attack on the town of Santa Cruz, in the Island of Teneriffe, in which he suffered the loss of his right arm. The wound refused to heal and he was obliged to return to England. He was decorated with the Order of the Bath by George III. and at the same time awarded a pension of $5,000. On the 29th of March 1798 he again set sail and joined the Earl of Saint Vincent (Admiral Jervis) off Cadiz 30 April. The admiral sent him to watch the progress of the armament at Toulon. Notwithstanding his vigilance, the French fleet which conveyed Bonaparte to Egypt escaped. Thither Nelson followed, and discovered the enemy's fleet moored in the Bay of Aboukir, where he obtained a complete victory, all the French ships but two being taken or destroyed (1 Aug. 1798). This achievement was rewarded with the title of Baron Nelson of the Nile and an additional pension of $10,000. Nelson set sail from Alexandria 19 August and arrived at Naples 22 September. Here began the pitiable period of his career, which left an indelible blot upon his otherwise unblemished name. He came under the influence of Lady Hamilton, wife of the English ambassador. His criminal relations with that lady, with whom he lived openly after the death of her husband, led to his ultimate separation from his devoted wife. Her influence can be recognized in many of his pub-

lic acts during the two years he spent under her spell in Naples. During this time he seemed to fall into a lethargy which for the time being made him forget his duty to Great Britain, and at one time he practically acted in the capacity of admiral of the Neapolitan navy. He did, however, really get the Neapolitans to take up arms against the French, but their army was soon subdued and the Parthenopean Republic was established by Napoleon.

Finally Nelson seemed to awake to a new sense of duty, being goaded by the appointment of a junior officer, Sir Sidney Smith, to an important command in the Levant, and also aroused by the exciting news that Admiral Bruix had escaped with the French fleet from Brest and was about to enter the Mediterranean. The imminent danger of the French regaining the naval supremacy of the Mediterranean set Nelson to work with all his old time vigor. In the meantime Jervis had resigned his command and was succeeded by Keith, with whom he was at variance from the very start. He determined to take Naples before the possible arrival of the French, and forthwith appeared before that city 24 June 1799. Here he found Commodore Caraccioli in command of a Neapolitan squadron which was in league with the Republicans who were in complete control. The forts of the city surrendered on 26 June and then followed Nelson's worst mistake. The Neapolitan admiral was not captured till 29 June, but Nelson immediately ordered a court-martial and condemned him to death, thus violating the capitulation concluded 23 June. Caraccioli was cruelly hanged. The whole miserable affair has been attributed to the influence of Lady Hamilton, who was also the favorite of the queen of Naples. It was little honor to Nelson that the despicable king of Naples, Ferdinand IV., soon after this created him Duke of Bronte.

Nelson's flagrant disobedience of orders shortly after this is also ascribed to feminine influence. He obstinately remained at Naples when ordered to join Lord Keith, who expected to meet the French fleet. This meeting, as a matter of fact, never took place, but a great victory might have been won had Nelson's fleet put in an appearance in time. This affair had a great deal to do with his quarrels with Keith and also his subsequent orders recalling him to England. He arrived home 6 Nov. 1800, having traveled overland with the Hamiltons; soon after this the scandal of his life culminated in the final breach with his wife.

Nelson's promotion to the rank of vice-admiral was dated 1 Jan. 1801 and he was at once employed on an expedition to aid Sir Hyde Parker against the league of the Northern Confederation. This league by its policy of armed neutrality was really aiding the French Republic, and Nelson wished to strike first at Russia, but this policy was overridden, and Nelson contented himself with making a bold attack on the Danish fleet at Copenhagen. He completely annihilated the fleet and silenced the shore batteries 2 April. During the battle his attention was called to the fact that his ship had been signaled to cease firing. Placing a telescope to his blind eye he remarked: "I really cannot see the signal." This remark added to his popularity at home. For his success and gallantry upon this occasion he was created a viscount, and his honors were made hereditary in his family, even in the female line. He then took command of the squadron for defense against the contemplated French invasion of England and attacked the French flotilla off Boulogne 15 August. He then went back to Lady Hamilton in Merton, Surrey, and remained there during the Peace of Amiens. When hostilities recommenced after the Peace of Amiens, Lord Nelson was appointed to command the fleet in the Mediterranean, and for nearly two years was engaged in the blockade of Toulon. But in spite of his vigilance the French fleet got out of port (30 March 1805), and being joined by a Spanish squadron from Cadiz, sailed to the West Indies. The British admiral hastened to give chase and pursued them all the way to the West Indies and back again to Europe, one of the most exciting chases that ever took place in naval history. Villeneuve finally took refuge at Cadiz, but Nelson's object had been accomplished, for without his naval forces Napoleon could not carry out his plan of invasion and was now obliged to turn his attention to Austria, which had in the meantime declared war. Nelson now had Villeneuve in a trap, but hardly expected him to leave the harbor. The French admiral, however, learned that Napoleon was contemplating relieving him of his command because he would not fight. In despair, Villeneuve decided on desperate measures and the French and Spanish fleets sailed forth to meet the dreaded enemy, leaving the harbor 19 October, the French commanded by Villeneuve, the Spaniards by Gravina. On 21 October they came up with the British squadron off Cape Trafalgar. Then occurred the famous battle of Trafalgar, as desperate an engagement as ever took place upon the high seas. The engagement ended in a glorious victory for the British, but it cost them the greatest naval hero England ever produced. Nelson was mortally wounded early in the day and died during the afternoon. His remains were carried to England and he was buried with much pomp in St. Paul's Cathedral 8 Jan. 1806.

Consult: Southey, 'Life of Nelson' (1828); E. de Forgues, 'Histoire de Nelson' (1860); J. C. Jeaffreson, 'Lady Hamilton and Lord Nelson' (1888), 'The Queen of Naples and Lord Nelson' (1889); Laughton, 'Nelson' (1895); Mahan, 'Life of Nelson' (1899); Russell, 'Horatio Nelson' (1899).

Nelson, Samuel, American jurist: b. Hebron, N. Y., 10 Nov. 1792; d. Cooperstown, N. Y., 13 Dec. 1873. He was graduated from Middlebury College, Vt., in 1813, and in 1817 was admitted to the bar. He soon established a reputation which gained for him a large practice and in 1823–31 he was circuit judge. In 1831 he became associate justice of the supreme court of New York and in 1837–45 he was chief justice. He was appointed associate justice of the Supreme Court of the United States by President Tyler in 1845 and in the famous Dred Scott case he sustained Chief Justice Taney in his decision that if Congress had authority to destroy slavery it had also power to establish it. He disapproved the intrusion of military power in what he considered civil affairs, but maintained an unquestioned loyalty during the Civil War. He was appointed by President Grant a member of the Alabama Arbitration Committee in 1871, and in 1872 he resigned from the bench.

Nelson, Thomas, American patriot: b. Yorktown, Va., 26 Dec. 1738; d. in Hanover County, Va., 4 Jan. 1789. He was the son of William Nelson, governor of Virginia 1770–1, and was educated at Eton and Trinity College, Cambridge, England. Returning to Yorktown in 1761, he was elected to the House of Burgesses, in which he served for several terms; and he also sat in the Provincial Conventions, 1774–5–6, in the last of which he introduced the resolution instructing the Virginia delegates in the Continental Congress to move for a declaration of independence. Later (1775–7) he was himself a delegate to the Continental Congress, and was a signer of the Declaration. He resigned on account of impaired health, but was soon (August 1777) in command of the Virginia State forces, at whose head he remained until near the close of 1782. At the siege of Yorktown he ordered American gunners to fire upon his own mansion, in which Cornwallis was believed to have his headquarters. In 1779 he was again a member of Congress, and again resigned by reason of ill health. During the next year on his own security he raised public moneys for Virginia and paid certain military arrearages out of his private funds. In 1781 he became governor of the State, succeeding Thomas Jefferson, but in a few months resigned. His patriotic generosity had impoverished him, and he saw his property sold for payment of public debts contracted on the security he had given, while his own days ended in circumstances of privation.

Nelson, William, American sailor and soldier: b. Maysville, Ky., 1825; d. Louisville, Ky., 29 Sept. 1862. Entering the United States Navy in 1840 he became lieutenant in 1855 and at the opening of the Civil War was put in command of the gunboats on the Ohio, with rank of lieutenant-commander. On leaving the navy, soon after he entered the army, became a brigadier-general of volunteers and commanded the 2d division under Buell and the Battle of Shiloh. In a quarrel with the Federal general, Jefferson C. Davis, he was fatally shot at the Galt House in Louisville.

Nelson, Wolfred, Canadian physician: b. Montreal, Canada, 10 July 1792; d. there 17 June 1863. He was a surgeon in the British army in the War of 1812, but in 1837 he headed the rebellion decided upon in the meeting of the "Four Countries." He was captured and sentenced to imprisonment for life in the Bermudas, but the sentence was declared illegal and he was liberated. He lived in the United States in 1838–42, when he returned to Montreal and was twice chosen mayor of that city. He also served as president of the medical board and College of Surgeons of Lower Canada.

Nelson, Canada, town, in the southeastern part of British Columbia; on the Kootenay River; about 18 miles west of Kootenay Lake and 250 miles west of Vancouver. It is in the midst of the noted Kootenay silver-mining region. Its chief industrial establishment is a large smelter. It has a foundry, lumber mill, machine shops, and other manufacturing plants. Pop. (1901) 5,273.

Nelson, England, a town of Lancashire, about 3 miles northeast of Burnley, and 30 miles north of Manchester. Among its chief municipal features are a free library, technical school, large recreation ground, and market hall; it owns also its water, gas, and electric lighting plants. It is a thriving cotton manufacturing centre. Pop. (1901) 32,816.

Nelson, a river in Canada, the largest in the Territory of Keewatin. It is an outlet of Lake Winnipeg; leaving the lake at the north end, it first flows north through several lakes to Split Lake, then northeast to Hudson Bay, which it enters through Port Nelson. The volume of water it discharges is very large; it is a deep, swift-flowing stream, with many rapids and cascades along its course of about 425 miles. It is navigable for boats to about 130 miles from its mouth, and for about 100 miles from Lake Winnipeg.

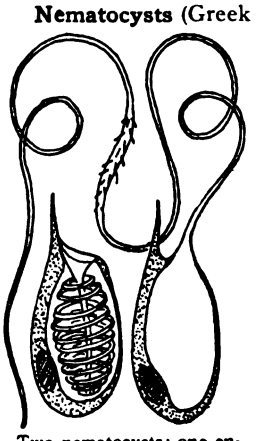
Nelson Fort, a former Revolutionary fort at Norfolk, Va., now the site of the United States Marine Hospital.

Nel'sonville, Ohio, city, in Athens County, on the Hocking River and on the Hocking Valley railroad; about 60 miles southeast of Columbus. It is in the vicinity of bituminous coal fields, and has a large trade in coal. Its chief manufacturing establishments are car wheel works, mining implement shops, foundry, and repair shops. The city owns and operates the waterworks. Pop. (1890) 4,558; (1900) 5,421.

Nelum'bium, a genus of aquatic plants of the family *Nymphaceæ,* containing the East Indian lotus (*N. speciosum*) and the Egyptian lotus (*N. cævulea*). The former serves many useful purposes in the East. The filaments are there deemed astringent and cooling, and are prescribed in burns, piles, and menorrhagia; the seeds are given to prevent vomiting, and to children as diuretics and refrigerants. The large leaves are made into bed sheets for fever patients; a sherbet made from the plant is given as a refrigerant in smallpox, etc. The rhizome, stalks, and seeds are eaten by the Hindus, and furnish a preparation known in commerce as "Chinese arrowroot." A fibre derived from the stalk is used as a wick for lamps in Hindu temples, the plant being considered sacred. See LOTUS.

Nem"athelmin'thes, a phylum of worms. See table of classification under ANATOMY, COMPARATIVE; EEL-WORMS; ROUNDWORMS; THREAD-WORMS; etc.

Nematocysts (Greek νημα, thread, κύστις, bag, cell), peculiar cells occurring in the *Cœlenterata* (q.v.) and in a few members of other groups of animals (*Protozoa Turbellaria, Mollusca*) which serve as weapons of offense and defense. In structure a nematocyst is a cell one end of which is drawn out into a long tube, the thread, which is inverted into the body of the cell as the finger of a glove may be turned into the palm. Connected with the cell



Two nematocysts: one entire, the other exploded.

is a hair-like structure, the cnidocil, and when this is touched the nematocyst «explodes.» The thread is forced out, carrying with it the fluid contents of the cell, which in its physiological action is much like formic acid. This is sufficient to kill small animals, to paralyze those of larger size. Some Cœlenterates, like the Portuguese man-of-war, have nematocysts which can produce very disagreeable effects on man. Once exploded, a nematocyst cannot be used again. From their structure and action nematocysts are also known as thread cells, nettle cells, lasso cells, and cnidæ.

Nemato'da, a class of worms in the phylum *Nemathelminthes,* the thread-worms, having a very elongated cylindrical body pointed at both ends, clothed in a tough cuticle, and containing in the body-cavity a clear fluid. The enteric canal is straight, and consists of pharynx (a stomodæum), intestine and rectum; the mouth is anterior and terminal, the arms ventral and near the posterior end. Excretory canals running in the lateral lines are usually present. "The nervous system," says Parker, "consists of a pharyngeal ring containing nerve-cells and giving off nerves forward and backward; of the latter a single ventral nerve-cord, or two cords, respectively dorsal and ventral, are of considerable size and extend to the posterior end of the body." The nematodes are in nearly all cases diœcious, immense numbers of eggs being produced, and impregnated within the body of the female. The class is divided into two orders: (1) *Nematoidea,* the free-living nematodes and most parasitic forms in which the cœlom is not lined by epithelium, but is bounded directly by body-muscles; (2) *Gordioidea,* a small number of great elongated worms (see EEL-WORMS) which are parasitic in the asexual, free-living in the sexual stage. See THREADWORMS.

Nematog'nathi, a group of fishes, the catfish (q.v.).

Nematoph'yton, a genus of fossil algæ, preserved in the Devonian rocks of the eastern United States and Canada, the stems of which were often several inches in diameter. The best known species is *N. logani.*

Nemcová, nyĕm'tsō-vä, **Bozena** ("BARBARA PANKL"), Czech poet: b. Vienna 4 Feb. 1820; d. Prague 21 Jan. 1862. Her reputation was made largely by the collections, 'National Tales and Legends' (1845–6), and 'Slovak Tales and Legends' (1858). Her 'Sebrané Spisy' ('Collected Works') appeared at Prague (with a biographical sketch by Podlipská).. One of the best of her original stories from common life was published in a German version as 'Die Grossmutter' in Reclam's 'Universalbibliothek'.

Nemea, nē'mę-a, Greece, a classic valley of Argolis, the site now marked by the village of Nemea, due north of Argos, on the railroad to the Gulf of Corinth. The valley from north to south is from two to three miles long, and more than half a mile broad. It possessed a sacred grove, with a magnificent temple to Zeus, and here biennially were held the celebrated Nemean Games, one of the four great national athletic and musical festivals of the Greeks.

Nemean (nē'mę-an or nę-mē'an) **Games,** in ancient Greece, public games or festivals were celebrated at Nemea, probably triennially. The Argives were the judges at these games, which comprised boxing and athletic contests, as well as chariot-races. The conquerors were crowned with olive.

Nemertin'ea, a class of *Platyhelminthes* (q.v.) of which a few are terrestrial and a few occur in fresh water, but the great majority are marine. As a rule they have a flattened body without any processes and covered on the outside with cilia. The mouth is on the ventral surface at the anterior end and the vent at the opposite end of the body. The alimentary canal is straight; in some with enlargements on either side at regular intervals. Above the alimentary canal is a peculiar proboscis which can be everted through an opening above the mouth, by means of which the animal captures its prey, which consists of other animals, largely of worms. There is no body-cavity, the body being solid from the intestine to the outer wall, except for the small tubes of the blood vessels and excretory organs. The sense-organs are the usually present eyes, and also, in many, grooves upon the sides of the head which are usually regarded as organs of smell. The nervous system consists of a "brain" around the anterior part of the alimentary canal, from which three nerve cords (two lateral and one between the digestive tract and the proboscis sheath) run backward through the body. Some nemertines develop directly while others go through a complicated metamorphosis, in which part of the body is cast off. Most nemertines are small, but some reach respectable dimensions. One species on the New England coast can stretch itself to a length of 15 feet or retract itself to two. The largest species (*Lineus longissimus*) may extend to 90 feet.

Nemesianus, nē-mē-sī-ā'nŭs, **Marcus Aurelius Olympius,** Latin poet of the close of the 3d century B.C., probably a Carthaginian. He won much fame by his verse at the court of Numerianus, who alone surpassed him in composition; wrote on fishing ('Halieutica'), sailing ('Nautica'), and hunting ('Cynegetica'), only a part of the last poem being extant; and is supposed to be the author of four pastoral poems found in MSS. together with Calpurnius' eclogues, and hence formerly attributed to Calpurnius. The peculiar movement of these pastorals has suggested the theory that the 'Pervigilium Veneris' is by Nemesianus. All his extant works are edited by Bährens (1879); the 'Eclogæ' by Schenkl (1885); an English version of the latter by Scott appeared in 1891.

Nem'esis, in Greek mythology, the daughter of Erebus and Night. Other accounts make her the daughter of Zeus and Necessity, or of Ocean and Night. She is goddess of retribution, the tamer of the passions, the avenger, the enemy of pride and haughtiness; and she watches over the observance of the honors due to the dead, on which account a yearly festival in memory of the departed was called by the Greek Nemesia. Nemesis is represented under the figure of a majestic female clothed in a tunic. With the right hand she grasps a part of her garments over her breast; in her left hand

she holds a cup. On coins she appears drawn in a car by dragons, sometimes wearing a mural crown, and rarely winged. The great number of coins and gems on which she is found proves her worship to have been extensive and popular.

Nemesius, nẹ-mē'sĭ-ŭs, Greek philosopher: b. in the first half of the 4th century A.D. He became bishop of Emesa in Syria, and has been remembered chiefly through his treatise on 'The Nature of Man,' which declares the freedom of the will, the supremacy of the spiritual powers, the indestructibility of matter. The book is thought to show some anticipations of the theory of the circulation of the blood. It has been translated into various modern languages.

Nemi, nā'mē, Italy, a classic lake about 18 miles south of Rome, filling the crater of an extinct volcano, the sides of which are formed partly of basalt and partly of consolidated scoriæ. The lake is 1,022 feet above the level of the sea, and has a circuit of five miles. Owing to its beauty, it is accounted the gem of the Alban Mountains, and was celebrated by the Latin poets under the name of Lacus Nemorensis or Speculum Dianæ — Diana's Mirror. On the northeast shore near the village of Nemi, a famous temple of Diana was situated, of which modern excavations have yielded interesting remains; remnants of rafts used in the festival services of Diana, and dating from the reign of Caligula, were also recovered from the bed of the lake in 1895.

Nemours, nė-moor, **Duc de** (Gaston de Foix). See Foix, Gaston de.

Nemours, Louis Charles Philippe Raphael d'Orleans, Duke of, French soldier, second son of King Louis Philippe: b. Paris 25 Oct. 1814; d. Versailles 26 June 1896. He entered the army in 1826; gained little by the Revolution of 1830, since he had been a favorite with Charles X., who intended to marry him to the daughter of the Duc de Berry; refused the crown of Belgium in 1831; served in the Belgian campaigns and in Algiers, where his bravery won him the grade of lieutenant-general in 1837; became heir apparent by the death of his brother, the Duke of Orleans, in 1842; but was so unpopular that he found it wise not to press his claims in 1848, but to remove to England. He returned to France in 1870, re-entered the army, from whose lists his name was struck by the anti-royalist measures of 1886, and spent his last years in retirement.

Nemours, France, a town in the department of Seine-et-Marne, 10 miles south of Fontainebleau. The old castle of Nemours, built in the 12th century, is memorable on account of the edict revoking the privileges of the Huguenots, signed here by Henry III., 7 July 1585. Pop. (1901) 4,861.

Nemours, with the surrounding territory, was erected into a duchy in favor of the Count of Evreux in 1404. In 1507 Louis XII. bestowed the duchy upon his nephew Gaston de Foix, who was killed at the battle of Ravenna in 1512. From 1528 to 1689 the duchy was possessed by the house of Savoy. In 1689 it was purchased by Louis XIV., who bestowed it upon the Orleans family. King Louis Philippe gave his second son the title of Duke of Nemours, and the titular dignity is still borne by a branch of the Orleans family.

Nena (nā'nä) **Sahib.** See Nana Sahib.

Nennius, nĕn'ĭ-ŭs, British historian: b. in the latter part of the 8th century. He is said to have lived in Wales and to have been the author of the chronicle, 'Historia Britonum,' or 'Eulogium Britanniæ,' reaching down to the 8th century. The manuscript, written in Latin, is in the British Museum, and the work has been republished several times. The best editions are those of J. Stevenson (1838), and Mommsen, in 'Monumenta Germaniæ Historica,' etc. (1898). An English translation by W. Gunn was published in 1819. Ellis speaks of the work as that of "a credulous compiler, though, from the antiquity of his materials, valuable to an inquisitive historian." His work gives the mythical account of the origin of the Britons, the Roman occupation, the settlement of the Saxons, and closes with the 12 victorious battles of King Arthur. The writer has preserved valuable fragments of earlier treatises which have been lost. The historical value of his work is not great, but in mythical and legendary matters it has a recognized importance. Consult Zimmer, 'Nennius Vindicatus' (1893).

Ne"o-Dar'winism. See Weismannism.

Neo-Hegelianism, the doctrine of a modern school of philosophy, which has representatives among English, Scottish and American thinkers. They profess their belief in an eternal consciousness, of which the universe is the object; basing their conviction on the theory that in the world of thought consciousness and object are correlatives, and mutually implicated; and that the existence of the physical universe was prior to that of finite consciousness, and this latter is in some way correlated with physiological organisms. The most prominent Neo-Hegelian in England was Green (see Green, Thomas Hill), who may be said to be the founder of English Neo-Hegelianism.

Neo-Kantianism, the teaching of those who accept Kant's theory of knowledge, but refuse to acknowledge the doctrine of practical reason as the best guide in working out a metaphysic. Among this school may be mentioned F. A. Lange and H. Cohen. See Kant, Immanuel.

Ne"o-Lamarck'ism, the doctrine held by a school of modern naturalists, mainly American, that the results of organic evolution are due mainly to the principles and factors formulated by Lamarck (q.v.) and expounded in the article Lamarckism (q.v.), and not mainly to natural selection as asserted by the Darwinians. The modification and expansion of Lamarck's theories, due to enlarged knowledge, constitutes Neo-Lamarckism,— a term first applied by Prof. A. S. Packard, who with E. D. Cope and Alpheus Hyatt, was among its foremost exponents.

Neo-Pla'tonism, the revival and mystical transformation of the Platonic philosophy, mainly through the speculations of non-Hellenic thinkers. The word has, however, two meanings. In the first and historic sense it denotes

the metaphysical theories which prevailed during the whole of the third and last period of Greek philosophy; and these theories and their several schools are usually spoken of as three in number: (1) The Jewish-Greek philosophy; (2) Neo-Pythagoreanism (q.v.), and (3) Neo-Platonism proper. In its general sense, Neo-Platonism was a syncretism of Orientalism, Judaism, and Hellenism. The favorite subjects of discussion among Neo-Platonists were what they styled the dualistic opposition of the divine and the earthly; God as an abstract conception; contempt of the world of the senses; various theories of intermediate beings, half human, half divine; asceticism and the nature of enthusiasm as expounded by Hermes Trismegistus (q.v.) and the Christian Gnostics (q.v.). Near the Neo-Platonists stand Philo (q.v.), Aristobulus, the Essenes and Therapeutæ (q.v.).

Neo-Platonism in a narrower sense is the philosophy which originated with Plotinus and his school, and not with Ammonius Saccas, as an ancient tradition relates. Neo-Platonism was a last attempt made by Alexandrian thinkers to explain the dualism of appearance and reality. This attempt was made by a despairing leap beyond nature and reason; a solution was sought outside rationality, by a sort of intellectual suicide, and the attempts ended in the dreams of passive mysticism. It was taught that if we lose self-conscious thinking, the distinction between subject and object disappears, and if we reach *ecstacy*, we attain "union with God" and in that union all antinomies vanish. If by philosophy we understand rational thinking, Neo-Platonism must be considered a philosophical failure, and as the Neo-Platonist movement was not continued in new developments, it may well be said to represent the exhaustion and dissolution of ancient philosophy.

Its historical movement has three stages. In its first stage Neo-Platonism was essentially a "scientific" theory. Its main characteristic was the emphasis laid upon knowledge, the object of knowledge being God, and the aim of philosophy to conceive the divine essence immediately and with the innermost activity of the soul. In the second stage of Neo-Platonistic development appeared Iamblichus' (q.v.) systematic theology of polytheism, which distinguished what is usually called the Syrian phase of Neo-Platonism. This theology stood in strong opposition to Christianity. In its third stage Neo-Platonism lost its identity and under this name we are presented with a mere scholastic recapitulation, in a dialectic way, of the whole of classical philosophy. This scholastic and historic Neo-Platonism is represented by Proclus (q.v.) who reigned philosophically supreme at Athens until his school was closed by that edict of Emperor Justinian (q.v.) in 529 which was "the official certification of the death of ancient philosophy." In almost all its stages Neo-Platonism was characterized by theurgy, magic and sorcery of all kinds, and Neo-Platonist teachers did not hesitate to call themselves hierophants and to make money by divination. In attempting to repair the ravages wrought in the Greek mind by a despairing Skepticism (q.v.) Plotinus propounded the theory that knowledge transcended reason; that the absolutely true could be comprehended immediately, and intuitionally, namely, by ecstacy. Such inner knowing was the beholding of "the One" in itself; and a resolving of self into the absolute. The subject could not, it was taught, master the absolute by objective knowledge or through the medium of dialectic.

The Godhead, "the First," "the One," "the Good," is the original Being, incapable of definite characterization, wholly unspeakable and superior to all comparisons; it is "that which stands above being," and is neither thinking, willing, nor desiring. The world emanates from out the Godhead by an eternal, timeless, and necessary process, without division of itself or loss of essence. The world, being an effluence or overflowing of the divine, is more or less perfect according to the degree of nearness to or remoteness from its source. Each degree of emanation, however, has for its principle the totality of being. Next to the original "One," reason is the most perfect. It contains in itself the Ideal World and the whole of true and changeless being. Christian Neo-Platonists often identified the reason (*Nous*) of Plotinus with Logos, the second person of the Christian Trinity. That was a mistake. Logos with Plotinus is scarcely more than "law" regarded as "vital force" and in operation resembling instinct. The Johannean Logos is both immanent and transcendant. From reason emanates the World-soul, though reason incurs no change thereby. The World-soul actualizes reason in the outer world; it gives external qualities to sensible matter, which is the last and lowest of the emanations. Matter is itself undetermined, has no quality nor being. The visible universe is only a transcript of the World-soul. Plotinus does not concern himself much about the fact of the imperfections of individual things and the sin which exists in the world. As the World-soul links reason and matter, so do individual souls partake both of reason and sense. Mankind has a supersensible soul, which has pre-existed, and a lower soul which builds up the body. Souls came down from the rational or light-world, which is their real home and retain a recollection of it, hence their longings are always for a return. From these longings come our redemption and our prospective union with Divinity, and the degree of seriousness with which we realize them determines our worth as individuals. Pure sense-perceptions do not help the soul in its soaring which is rather promoted by thought and reflection. The strongest incentive and most potent force in the elevation of human nature is love of the beautiful, the Platonic ἔρως Neo-Platonism, together with Neo-Pythagoreanism, which had preceded it, represents an effort of paganism toward reform and reconstruction in order to meet the supernaturalism, monotheism, and universalism of the victorious Christianity which was everywhere pushing hard upon pagan thought and religion. In Iamblichus ("the divine" or "the famous hero" as Emperor Julian (q.v.) called him) Neo-Platonism finds expressed its religion, and expressed not so much according to Plato as according to Pythagoras (q.v.). Iamblichus created a fantastic pantheon in order to bring the entire world of gods into a system, in which he co-ordinated all cults, excluding Christianity, which was feared as a rival; but this erudite religion failed to meet "the desire of the nations" or

"the spirit of the times." "Any old woman of the Christians," said Augustine, sarcastically, "is wiser than these philosophers."

Neo-Platonism, as represented by Proclus, made a last supreme effort to retain an authoritative position in the world of thought. Proclus attempted to systematize the entire historical content of Greek philosophical thought, and place it upon a coherent and logical basis, but the effort was fruitless. A few feeble echoes of this teaching are perceptible in the writings of some of the Church Fathers, as for instance, Clement and Origen. Subsequent phases of philosophic speculation bear sometimes the imprint of Neo-Platonism. Attempts were made by Ficinus (1433–99), a celebrated Italian scholar, by Pico della Mirandula and other Florentines for its restoration. The English "Cambridge Platonists" in the 17th century also tried to revive it. Thomas Taylor (q.v.) (1758–1835) may be called the last European Neo-Platonist.

Consult: Whittaker, 'The Neo-Platonists'; Bigg, 'Neo-Platonism'; Richter, 'Neu-Platonische Studien'; Kirchner, 'Philosophie des Plotin'; the larger Handbooks of Philosophy, such as those of Ueberweg, Windelband, and Zeller.

C. H. A. Bjerregaard,
Librarian, New York Public Library.

Neo-Pythagoreanism, a revived form of Pythagoreanism held in the 1st century B.C. at Alexandria. The author of this revival was Nigidius Figulus, a Roman magistrate; but Apollonius of Tyana (q.v.) was its most brilliant expounder. The latter was an opponent of Neo-Platonism (q.v.) and mixed the philosophy of numbers with certain modified forms of Oriental theosophy, and ascetic ideas. Consult: Zeller, 'Die Philosophie der Griechen' (1880–1); Vacherot, 'Histoire Critique de l'Ecole d'Alexandrie' (1846–51).

Ne'ocene, in geology, a term used by the U. S. Geological Survey to include what Lyell called the Miocene and Pliocene periods. The word means "new (or late) recent," and is contrasted with Eocene, "dawn (or early) recent." See Tertiary.

Neoco'mian (Lat. *Neocomum*, Neuchâtel), in geology, a term applied to the lowest marine stages of the Cretaceous system, because of its typical occurrence at Neuchâtel in Switzerland. There and in southern France this formation, consisting of limestones and marls, is as much as 1,600 feet thick. The term corresponds to the English Wealden and lower greensand, and to the German Hils; is little used in America; and in France is used broadly and strictly, Neocomian in the wider sense including the stricter Neocomian (made up of Hauterivian and Valanginian), as well as Barremian and Aptian. Consult Pavlow, 'Quarterly Journal London Geological Society,' Vol. LIII., 1896.

Neody'mium, in chemistry, a substance, provisionally considered to be an element, whose existence as a constituent of didymium (q.v.) was recognized by Auer von Welsbach. It has the chemical symbol Nd and an atomic weight of about 140.8, and is distinguished from other constituents of didymium by yielding rose-colored salts. Its oxid has the formula Nd_2O_3. Further research is necessary before the elementary character of neodymium can be regarded as positively established.

Ne'ogene (Greek, "late-born," "late"), in geology, a term used by Continental geologists to include the Lyellian Pliocene and Miocene, that is, corresponding with Neocene (q.v.), as used by the U. S. Geological Survey.

Neolith'ic, in archæology, the more recent of the two periods into which the Stone Age has been subdivided. The Neolithic stone implements are finely shaped and polished, and are found in connection with the remains of extinct animals.

Ne'on (Greek, "new"), a gaseous element constituting from the fifty-thousandth to the hundred-thousandth part of the bulk of the earth's atmosphere, which was discovered by Ramsay and Travers, in 1898, in liquid argon. Neon closely resembles helium and argon (qq.v.) in its general properties, but its properties are less perfectly known. The density of neon appears to be about 9.96 times as great as that of hydrogen under the same conditions of temperature and pressure; and although no compounds of neon with other elements have yet been prepared, this density, taken in connection with the fact that the ratio of the specific heats of the gas appears to be 1.66 (see Argon, and Gases, Kinetic Theory of), indicates that the atomic weight of neon is about 19.92.

Ne'ophyte (Greek, "newly planted or grafted on"), originally applied to those newly initiated into the Eleusinian or other ancient Greek mysteries, of whom Plato says, "there are many wand bearers (the wand being the badge of the initiated) but few mystics." The catechumens who had been just baptized were so styled in the early Church. These newly made Christians were considered less likely to stand firm against paganism than their older and more experienced brethren. Hence the term was slightly tinged with disparagement. St. Paul forbade the ordination of the neophyte or novice (1 Tim. iii. 6), and the 3d Council of Arles (524) decreed that a year's probation was necessary for candidates for holy orders among the newly baptized. Yet Ambrose was elected bishop of Milan (374) when he was but a catechumen and was consecrated soon after his baptism. Newly converted pagans or disbelievers are still styled neophytes by Roman Catholic missionaries and Gregory XIII. established a college at Rome (1622), the Propaganda, in which they might be educated and trained to preach to and convert the people of their own land.

Ne'oplasms. See Tumors.

Neoptolemus, nē-ŏp'tŏl'ē-mŭs (also called Pyrrhus), in Greek legend, the son of Achilles and Deidamia. Taken to Troy by Odysseus, he was one of the band who captured the city by means of the wooden horse. He slew Priam and took to himself Andromache, the wife of Hector. He afterward went to Epirus, where he married Hermione, in consequence of which Orestes, her former lover, killed him.

Neornithes, nē-ôr'nĭ-thēz, or **Euornithes,** a sub-class of the class *Aves* (birds) embracing all known birds, fossil or recent, since the Jurassic Period, as distinguished from another sub-class, *Archæornithes,* which, contains, so far as yet known, only the archæopteryx (q.v.). The sub-class *Neornithes* may be divided into

three sub-divisions, namely (1) *Ratitæ;* (2) *Odontolcæ;* (3) *Carinatæ.*

Neosho, Mo., city, county-seat of Newton County; on the Kansas City, P. & G. and the St. Louis & S. F. R.R's; about 170 miles southwest of Jefferson City and 140 miles south by east of Kansas City. It was settled in 1839; in 1868 was incorporated as a town, and received its city charter in 1878. It is near the lead and zinc mining region of Missouri. The chief manufacturing establishments are machine-shops, flour mills, foundry, agricultural implement works, repair shops, and furniture factory. There is located here a government fish hatchery which occupies 13 ponds. It is the seat of the Scarritt Collegiate Institute (M. E. South) and has a high school, elementary schools, and a public school library. Pop. (1890) 2,198; (1900) 2,725.

Neosho, nē-ō'shō, a river which has its rise in Morris County, Kan., in the central part of the State. Some of the small streams which form the head-waters have their sources near short streams that flow north into the Kansas River. The Neosho flows south by east and enters the Indian Territory at the northeast corner. It continues an irregular course, mainly southeast, for a distance of about 40 miles, then turns southwest, which course is continued to its junction with the Arkansas River at Fort Gibson. Its whole length is about 355 miles. Some of the cities on its banks are Council Grove, Emporia, Burlington, Iola, Humboldt, Erie, and Oswego, all in Kansas.

Neot'eny, a term formerly applied to a phase of Parthenogenesis (q.v.). The larva of Amblystoma, or the Siredon, has been known not infrequently to lay eggs which have hatched young. This appears due to the premature development or acceleration of the reproductive organs and is comparable to the phenomenon of production of larvæ by the maggot of a fly (Miastor) to which the name of pædogenesis has been given. See under PARTHENOGENESIS.

Neotrop'ical Region, or **Neogæa,** one of the primary faunistic divisions in the zoogeographical scheme of Wallace and Sclater, embracing South America, Central America, as far north as the highlands of northern Mexico and the West India islands. It is perhaps the most sharply defined and separable of all the "regions," but shows some extraordinary affinities with eastern South Africa (Madagascar) and Australasia; hence some students of the distribution of animals have united it with those parts of the world in a still more comprehensive "province," called the Antarctic or Neogæan, in contrast with the Northern hemisphere as the Holarctic or Arctogæan Province. See ZOOGEOGRAPHY.

Neozo'ic (Greek, "late life"), in geology, a term introduced by Edward Forbes, but never in common usage, to include the Mesozoic and Cenozoic, between which he argued there was no such distinction as between them on the one hand and the Palæzoic on the other. The word is sometimes used as an equivalent of Tertiary and sometimes as synonymous with Cenozoic.

Nepal, nē-pâl', **Nipal,** nē-pâl', or **Nepaul,** Asia, an independent kingdom, on the southwest slope of the highest part of the Himalaya range, north of India, bounded on the north by Tibet, on the east by Sikhim, and on the south and west by Bengal, and the United Provinces of Agra and Oudh, British India. It lies between lat. 26° 25′ and 30° 17′ N., and lon. 80° 6′ and 88° 14′ E.; is 500 miles long with a maximum breadth of 150 miles, and has an estimated area of 54,000 square miles. The main portion of the country is a table-land from 3,000 to 6,000 feet above sea-level. Within its boundaries are the highest mountains in the world, Everest, Dhawalagiri, and on its eastern border, Kanchinjinga. From the mountains, the land gradually descends southward, forming four distinct terraces, differing in climate and vegetation. The Terai or southern lowland, well wooded and extensively cultivated, is traversed by numerous small streams. The most important rivers are the Karnali, the Gandak, and the Kusi, all of which rise in Tibet, and force their way through the Himalayas, by deep and precipitous gorges to join the Ganges. The climate is on the whole, temperate, except in the most elevated northern districts, where it is very cold. Magnificent forests of sal, sisoo, and toon trees stretch along the declivities of the lower hills into the adjacent plains. The forests higher up exhibit a greater variety, gradually assuming more and more of an Alpine character. The principal products are rice, wheat, barley, pulse, sugarcane, buck-wheat, hemp, cotton, tobacco, and madder. In the mountainous parts a valuable article of cultivation is a large species of cardamom, and in other places ginger is grown to a considerable extent. Pasturage is on the whole scarce and indifferent. The sheep and goats, however, have fine wool. Horses are imported from Tibet. The wild animals are elephants, black bears of great size, hogs, hog-deer, foxes, jackals, and a few tigers. Fish abound in the streams of the Terai. The manufactures of Nepal are confined chiefly to two kinds of coarse cotton cloth, called khadi and changa, of which the dress of the middle and lower classes of the people is made. Articles in copper, brass, and iron are also manufactured in various places; likewise bells of a kind of bell-metal called phul, but considered inferior to those of Tibet; and also a very strong paper, remarkably well fitted for packages. The trade of Nepal is chiefly carried on with British India and Tibet. From the former it imports Bengal cottons and muslins, silks and raw silk, carpets, English cutlery, etc.; and from the latter Chinese silk stuffs, paper, drugs, gold and silver, sheep, musk, skins of the musk-deer, etc. Its chief exports are the natural products of the country.

The government of the country is a military oligarchy with a maharaja as the nominal head, but a prime minister as its real ruler. The ruler acknowledges a certain amount of dependence on the Chinese government, but is in more real dependence on British authority. A British Resident and a small body of British troops are stationed at the capital, Khatmandu, and British influence is gradually increasing. The population of the country is estimated at over 2,000,000. The inhabitants are chiefly Newars, a race probably of Mongolian and Chinese origin; the dominating race is the Ghurkas (q.v.). In the east there is a considerable mixture of Hindus. The pre-

vailing religion is Brahmanism, but there are also some Buddhists. Most of the domestic servants are slaves. The ordinary language of Nepal is the Prabratiya or mountain Hindu dialect, but the Newars have a language peculiar to themselves. The country was formerly possessed by numerous independent rajahs, and extended west to the Sutlej; but about the middle of the 18th century the rajah of Ghurka began to extend his dominions by conquest, in which he and his successors were so successful that in less than 50 years they had conquered the whole of Nepal, and made themselves kings of that territory. Subsequently (1816) a large portion of the kingdom was cut off by the British, who reduced its western limit to the river Kali instead of the Sutlej. By the Kot massacre in 1845 Jung Bahadur made himself master of the country, and proved a firm but beneficent ruler; at his death in 1877 he was succeeded by his brother who reigned until his assassination in 1885, when he was succeeded by the present maharaja Dhiraj Pirthvi Bir Bikram, born 1875.

Nepenthe, nẹ-pĕn'thē (Greek, *nē*, a negative prefix, and *penthos,* sorrow), a magic potion or drug which was fabled by the poets to banish the remembrance of grief and to cheer the soul. The invention was attributed to the Egyptians.

Nepen'thes, a genus of pitcher-plants (q.v.).

Neph'elite, or **Nephelin,** a native silicate of aluminum, potassium and sodium, crystallizing in the hexagonal system, and also occurring in massive forms. It exhibits various colors, and has a vitreous lustre, a hardness of from 5.5 to 6, and a specific gravity of about 2.6. It occurs in recent eruptive rocks, notably at Mount Somma, Vesuvius.

Nephe'lium, a genus of fruit-trees. See LITCHI.

Nephi, nē'fī, Utah, city, county-seat of Juab County; on the Sanpete V. and the Oregon S. L. R.R.'s; about 80 miles south of Salt Lake City. It is in a high valley in which there are a number of good farms. The chief products of the surrounding country, all of which contribute to the prosperity of Nephi, are farm products, salt, gypsum, lumber, and live stock. Pop. (1890) 2,034; (1900) 2,208.

Neph'oscope, an instrument for determining the apparent velocity and motion of clouds. It is in the form of a horizontal mirror, with compass-points or degrees drawn on the mirror, or on the surrounding frame; with an adjustable sighting piece placed above the mirror. The sighting-piece serves as a fixed point for viewing the cloud shadow as it moves away from the centre of the mirror.

Nephrectomy, the excision or removal of a kidney. In cases of calculi, multiple abscesses, pyonephrosis, hydronephrosis, sarcoma, wounds, tears and ruptures of the ureters, and movable kidneys this operation may be called for. The removal of a single or horseshoe kidney is considered a fatal operation. Before removing a kidney it is necessary to ascertain whether the remaining organ is capable of excreting its due amount of urine. Abdominal nephrectomy (anterior nephrectomy) is the excision of a kidney through an incision in the abdominal wall; lumbar nephrectomy (posterior nephrectomy), an excision, through an incision in the loin.

Nephrorrhaphy, nephropexia, or nephropexy is the fixation of a movable kidney by sutures.

Neph'rite. See JADE.

Nephri'tis. See BRIGHT'S DISEASE; CIRRHOSIS, KIDNEYS.

Nephrotomy, incision of a kidney, an operation deemed necessary by the surgeon when it has been ascertained by exploration with the aspirator-needle or otherwise that the kidney is the seat of any condition or disease which endangers the life of the patient. It is resorted to for the removal of calculi (nephrolithotomy), of tumors, and for relieving congestion.

Nephthys, nĕf'thĭs, in Egyptian mythology, a deity, sister of Osiris and Isis, wife of Typhon, and mother of Anubis by Osiris. Some consider her as the symbol of the Egyptian coast on the Mediterranean; others as the personification of the five intercalary days of the Egyptian year, in which point of view they are called her children by Mercury, the Sun, and Saturn.

Nep'idæ. See FRESH-WATER INSECTS.

Nep'igon, or **Nip'igon,** a lake in Canada, in the northwestern part of the province of Ontario; about 33 miles north of Lake Superior. It is over 800 feet above Superior; about 65 miles long and 40 miles wide; its outlet is Nepigon River which flows south and enters Lake Superior through Nepigon Bay. The coast line is remarkably rocky and irregular, in some places lofty headlands; the total length of coast line is nearly 600 miles. It has a number of small wooded islands. Several streams enter the lake, and in the vicinity are a large number of small lakes, all of which, together with Nepigon, once formed a very large lake. The lake is a favorite place for sportsmen as it is well stocked with fish.

Nepomuk, Johann, yō'hän nā'pō-mook, patron saint of Bohemia: b. Pomuk between 1330 and 1340; d. Prague 20[?] March 1393. He rose to be a high ecclesiastical dignitary, and was put to death at the order of King Wenzel IV. of Bohemia by being thrown into the Moldau River. Differences as to Church policy and other reasons, often conflicting, are assigned for this procedure. But the most authentic account, compiled (1670) originally by Bohuslav Balbinus, a Jesuit, narrates the story as follows: According to Balbinus, Nepomuk obtained the degree of magister at Prague, eventually became almoner to King Wenzel and confessor to Queen Johanna and, after imprisonment and torture, was put to death for refusal to divulge certain matter of the confessional. Balbinus dates the martyrdom in 1383, but the best sources make the time as above given, 10 years later. Hajek of Labocan conjectured (1541) that there were two Johns and this idea was assumed by Balbinus; but Dabrovski established (1787) the fact that there was but one. Abel ('Die Legende vom heiligen Nepomuk' 1855) presented the curious theory that John of Nepomuk was really the development of the Protestant hero, John Huss, into a Catholic saint. But this is altogether without foundation. Previous to his canonization by Pope Benedict XIII. in 1729,

Nepomuk had already been venerated as protector against slander and danger by water. His day, 16 May, is still observed in Bohemia as a time of high festival. Consult: Frind, 'Der geschichtliche Johannes von Nepomuk' (2d ed. 1871).

Nepos, nē'pŏs, **Cornelius,** Roman historian: b. Upper Italy about 100 B.C.; d. about 24 B.C. His earliest writings consisted of verses and three books of 'Chronica.' With the exception of a geographical treatise, his remaining works were directed toward the study of manners, customs, and character. Such are the five books of 'Exempla,' supposed to have been an account of the men who stood as types of the virtues of earlier Rome. Such, too, were the elaborate biographies of Cicero and Cato the Elder. But the most comprehensive of his publications was the 'De Viris Illustribus' ('Of Illustrious Men') in probably 16 books, in which the lives of foreigners and of Romans were juxtaposed in a parallel arrangement. Of this there are extant the portion 'De Excellentibus Ducibus Exterarum Gentium' ('Of Prominent Foreign Generals') and the biographies of Cato and Atticus. The lives of Atticus and Cato have been uncontestably assigned to Nepos, but until the edition of Dionysius Lambinus (1569) the 'De Excellentibus Ducibus' was supposed to be the work of a certain Æmilius Probus. Lambinus' verdict, based on both historical and stylistic grounds, has been almost universally accepted. The style of Nepos is too colloquial; his matter is often lamentably inaccurate; but the essays are in general well arranged and fair in their judgments. There are several good editions by Nipperdey (rev. by Lupus 1879) and others.

Nep'otism, a system or custom practised by several of the earlier popes of granting high honors, dignities, offices, pensions, and the like to their family relations, generally their nephews; hence family favoritism of any sort.

Neptune, (1) in astronomy, the most distant of the known planets, its mean distance from the sun being 2,745,998,000 miles, and its least distance from the earth 2,629,000,000 miles. The eccentricity of its orbit is .00872; its inclination to the plane of the ecliptic is 1° 47′. The apparent diameter is about 2′ 7″. The real diameter is estimated at 36,000 miles, and it seems to have very little polar compression. Its mass is about 16¾ times that of the earth. The largest telescopes give us little information as to whether or not it has belts. A satellite of Neptune was discovered by Lassell of Liverpool in 1846. It is peculiar in revolving from east to west. Neptune revolves round the sun in 164.6 years. (2) In Roman mythology the god of the sea; son of Saturn and Rhea, and brother of Jupiter and Pluto. He is variously represented; sometimes with a trident in his right hand, a dolphin in his left, and with one of his feet resting on part of a ship; at others in a chariot drawn by sea-horses, with a triton on each side. See Poseidon.

Neptune, Temple of, the name of two ancient structures, one at Paestum in Lucania, and the other on the Campus Martius in Rome. The latter was erected by Agrippa 26 B.C. It was destroyed by fire 80 A.D., but was restored by Hadrian.

Neptu'nian Theory (Lat. *Neptunus,* god of sea), in geology the view advanced by Werner that geological change is due entirely to the influence of water, the earth in the beginning having been covered with water, which hold rock-material in solution. This hypothesis, also styled Diluvian Theory, was opposed by the Vulcanians, who held the igneous theory. See Geology.

Nérac, nā-räk', France, a town, capital of an arrondissement in the department of Lot-et-Garonne, 16 miles southwest of Agen, on the precipitous banks of the Baise. In its old castle, now a mere ruin, Henry IV., of whom there is a bronze statue in the town, spent part of his youth, and at an earlier period Calvin and other reformers found an asylum with Margaret of Valois, queen of Navarre. The town has manufactures of coarse woolens, shipbiscuit, corks, etc. Pop. (1901) 6,435.

Nerbudda, nėr-bŭd'da, or **Narbada,** nŭr-bä'dä, India, a river which rises in the Maikal range, 3,493 feet above sea-level, in the north of the Central Provinces, flows first west and northwest across the Amarkantak plateau, then west, inclining gently to the south, and after forming part of the boundary between the Central Provinces and Indore, falls into the Gulf of Cambay, after a course of about 800 miles. In the wet season it rises in some places 25 feet, and in others 70 feet above its lowest level. Though much obstructed by shelves and cataracts, it is navigated by boats to the falls of Daree, about 250 miles from its mouth. To the Hindus the river is a sacred stream, almost equal to the Ganges in sanctity. It is regarded as a meritorious act to walk from the sea to its source and back again along the banks of the river. There are valuable coal and iron beds in the valley near Hoshangabad, and a railroad skirts the river from Barhanpur to Sihora.

Nereids, nē'rē-ĭdz, in Greek mythology, were sea nymphs, daughters of Nereus and Doris. They were 50 in number, and they had, like their father, the gift of prophecy and the power of assuming different shapes. They were specially the nymphs of the Mediterranean, and were distinguished on the one hand from the Naiads or the nymphs of fresh water, and on the other hand from the Oceanides or nymphs of the ocean.

Ne'reis, a marine annelid, one of many species, scattered throughout the world, of polychæt worms (see Polychæta), of the family *Nereidæ,* which contains the most highly organized of this group of animals — "the highest type of *Annulata*" according to Packard. Their bodies are visibly annulated, flat and scaly. A distinct head is present, provided with a retractile proboscis, which is usually armed with teeth or jaws. Eyes and tentacles are borne on the head. The locomotive appendages are very fully developed, and the respiratory or breathing organs, in the form of tuft-like branchiæ or gills of rudimentary nature, are borne on the dorsal aspect of the body-segments. The sexes are separate, the eggs are probably laid in masses between tide-marks, and the young at first appear as surface-swimming ciliated bodies, but the stages of development have not been traced. A typical and numerous species on the Eastern American coast is *Nereis virens,* which lives

between tide-marks in holes in the mud. It secretes a viscid fluid lining its hole, up which it moves, pushing itself along by its bristles and ligulæ. At night, probably, during the breeding season, they leave their holes and swim at the surface of the water. Some of these nereids are what Van Beneden calls "free messmates." *N. bilineata* and *N. succinea* inhabit the tubes of a species of Teredo, and *N. costæ* is found in the cavities of sponges. Consult: Packard, 'Zoology' (1897); Arnold, 'Sea Beach at Ebb Tide' (1901).

Nereus, nē'rūs, in Greek mythology, a divinity of the sea, the progenitor of the Nereids (q.v.). He is represented as an old man, with a wreath of sedge, sitting on the waves with a sceptre in his hand.

Neri, Filippo de', fē-lēp'pō dā nā'rē (known in English as Saint Philip Neri) founder of the order of Oratorians (q.v.): b. Florence 22 July 1515; d. Rome 26 May 1595. He was of noble family with rich connections, but his only aim in early life seemed to be that of self discipline and the pursuit of learning. He deliberately sacrificed the favor of a rich uncle, who wished to make his nephew heir to his fortune, by secretly leaving him (1533) and taking up his residence at Rome as private tutor in a gentleman's family. He sold his books in 1538 and gave the price to the poor, and ever afterward devoted himself to the sick and to pilgrims. In 1548 he established the Fraternity of the Holy Trinity for the succoring of the sick and pilgrims, founding the hospice which later became one of the finest at Rome. He did not enter the priesthood until 1551 and in 1574, with Cæsar Baronius and other priests, he founded the Oratorians of which he was styled "Father" up to 1592. His congregation received the approval of Gregory XIII. in 1575. He was the most popular saint in Europe since the days of Francis d'Assisi and of unprecedented independence and originality in his life and utterances. Goethe has styled him "a saint with a sense of humor." His motto was "Spernere mundum, spernere se ipsum, spernere se sperni." (Despise the world, despise self, think it a light thing to be despised of all.) He was canonized in 1622, and in 1726 the day selected for his festival was the anniversary of his death. His letters (1751), poems (Rime Oneste, Vol. 8), have been published. Consult: Gallonio, 'San Filippo dei Neri'; Reiching, 'Leben des heiligen Philippo de' Neri' (1859).

Neri'ne, a genus of plants of the order *Amaryllidaceæ* (q.v.). The 10 species, which are all South African, are bulbous-rooted, have narrow leaves which die down during the spring months, and leafless scapes which appear in late summer surmounted by umbels of strikingly beautiful six-parted flowers varying from scarlet through all tints to white, and seemingly covered with hoar frost. In popular usage the name *Nerine japonica* is used, but this name is properly applied to a distinct plant, which, however, has similar habits and may be managed in the same way. It has black seeds; true nerines have green seeds. The most commonly grown species is *N. sarniensis,* the Guernsey lily. The bulbs should be planted in autumn in the greenhouse and given plenty of water and plant food until the leaves turn yellow when both may be gradually withheld, the pots laid on their sides and the bulbs allowed to mature. In late summer, when the plants show signs of life, water may be given.

Nernst, nĕrnst, **Walther,** German physicist: b. Briesen, West Prussia, 25 June 1864. He was educated in the leading universities of Germany and in 1889 became lecturer in chemistry at Leipsic. In 1891 he was called to the chair of chemistry at Göttingen where in 1895 he established an institute for physical chemistry. His invention of the Nernst incandescent electric lamp has made him a prominent figure in the electrical world. He has written: 'Theoretische Chemie' (1898); 'Ueber die Bedeutung elektrischer Methoden u. Theorien für die Chemie' (1901); etc.

Nernst Lamp. See ELECTRIC LIGHTING.

Ne'ro, Lucius Domitius Ahenobarbus (after his adoption by the Emperor Claudius called Claudius Cæsar Drusus Germanicus), 6th Roman emperor: b. Antium (Latium) 37 A.D.; d. 68 A.D. He was the son of Gneius Domitius Ahenobarbus and Agrippina, the daughter of Germanicus. His adoption was due to the marriage of his mother with the emperor. Soon after, when only 16 he married Octavia, daughter of Claudius and Messalina 53 A.D. Agrippina wished to secure the succession to her own son to the prejudice of Britannicus, the son of Claudius. In this she succeeded, and Nero became emperor on the death of Claudius in the year following 54 A.D. His tutors were able men, Burrus, the prefect of the prætorian guards, and the philosopher Seneca (q.v.). For a short time he gave a promise of reigning well, and allowed himself to be guided by his instructors, but it was not long before he gave himself to the greatest excesses and cruelty. His first crime was the poisoning of Britannicus, 55 A.D., whom Agrippina, having quarreled with her son, threatened to raise to the throne in place of Nero. He next caused Agrippina herself to be put to death, 59 A.D. The most distinguished victims of his cruelty, beside Britannicus and Agrippina, were his instructor Seneca, the poet Lucan, and his wives Octavia and Poppæa Sabina. "My predecessors," said he, "did not know the rights of monarchy. People may hate me, if they only fear me." During his reign, in 64 A.D., a great conflagration took place at Rome, which lasted for six days and seven nights, and when thought to have been extinguished, broke out and burned two days more. During this fire most beautiful monuments of art and of history were burned to the ground. Nero was commonly suspected of being the originator of the fire, with the view of having a real representation of the burning of Troy; and although this suspicion was admitted by Tacitus to be without evidence and is regarded by modern scholars as almost incredible, it was so generally entertained at the time that Nero did his utmost to transfer the guilt of this action to the Christians, whom he caused to be cruelly persecuted for it throughout the empire. He caused the burned part of the city to be rebuilt in a manner more splendid and magnificent than before. The most remarkable of his buildings was the palace which he erected for himself in Rome, known as the Golden House. Several conspiracies, formed against

him in Rome, ended in the destruction of the conspirators themselves. At last the revolt of Galba, his governor in Spain, succeeded. The Prætorian guards declared for Galba, and the Senate pronounced against Nero sentence of death. The tyrant anticipated the punishment which awaited him through requesting death by the sword of an attendant. Consult: Baring-Gould, 'The Tragedy of the Cæsars,' Vol. II. (1892).

Nero, Golden House of. See GOLDEN HOUSE OF NERO.

Ne'roli, a perfume, extracted from the flowers of a small Italian orange tree. It is an essential oil, obtained by distillation from the orange blossoms.

Nertchinsk, nĕr-chĭnsk', Siberia, a town in the Transbaikalia Territory, on the Nercha, near its mouth in the Shilka, 570 miles east of Irkutsk. Although comparatively small it is an important trading centre for Russians, Mongols, Turcomans, and Tunguses, and has a considerable export trade in the gold, silver, lead, tin, and zinc of the surrounding mining region. Pop. (1897) 6,713.

Nerthus, nĕr'thŭs, in German mythology, a goddess, regarded as representing the earth.

Ner'va, 13th Roman emperor: b. Narnia, Umbria, 32 A.D.; d. 98 A.D. He occupied posts of trust in the reigns of Vespasian and Titus. He became emperor at an advanced age, after the assassination of Domitian, 96 A.D. through the aid of Parthenius, chamberlain of the imperial palace, and Petronius Secundus, commander of the Prætorians. Nerva was a man of cultivated mind, with some poetical talent. His reign was beneficent. He recalled exiles, allowed no senator to be put to death, abolished several oppressive taxes, observed a strict economy for the relief of the poor, and tolerated Christianity. But he was unable to put down the violence and insubordination of the Prætorian soldiers. Seeing, perhaps, that an element of greater energy was needful, he adopted as successor Marcus Ulpius Trajanus (see TRAJAN), then commanding an army in Germany, whom he made co-sovereign. Consult: Merivale, 'History of the Romans under the Empire' (1865).

Nerval, Gerard de, zhā-rār dė năr-văl (properly GERARD LABRUNIE), French author: b. Paris 21 May 1808; d. 26 Jan. 1855. He was educated at the Lycée Charlemagne, and made one of the first renderings (1828) of Goethe's 'Faust.' In his 'Poésies Allemandes' (1830) are to be found translations from other German authors, such as Schiller, Uhland, and Heine. He was a collaborator on various literary periodicals; wrote verse, including 'Elégies Nationales et Satires Politiques' (1827); a few dramas, among them 'L'Alchimiste' with Dumas; and several volumes of prose, such as 'Scènes de la Vie Orientale' (1848–50), and 'La Bohème Galante' (1855).

Nervii, nėr'vĭ-ī, an ancient people of Gaul, famous for the stand they made against Cæsar's advance in 57 and 54 B.C. They submitted to the Romans in 53 B.C.

Nervous Diseases, disorders arising either from actual changes in the structure of nerve-fibres or nerve-centres, or from some irregularity of nerve-function without actual structural change. Thus nervous diseases may be due to inflammation or degeneration of nerve-substance; to the pressure on some part of the nervous system by tumors, effused blood, or other fluid; to the death of some part by the cutting off of its blood-supply, etc.; to accident or injury due to internal or external poisons, or to violence; or they may be the result of lowered nervous action as a part of general bad health. It is customary to speak of organic and functional diseases of the nervous system, meaning diseases in which structural changes are demonstrable, and those in which no such alterations can be seen by appropriate instruments of precision. While such a difference is perfectly valid from the practical point of view, from the more scientific standpoint no such distinctions can be maintained save on the most general grounds.

Nervous diseases are further subdivided into affections of the motor and sensory functions of the body (neuroses), and those of the mental or thought processes (psychoses). Most disorders occupy both fields within certain limits, the distinctions being purely formal and academic. Nervous diseases are extremely widespread in the community. It has been estimated that one in every 300 of the population is afflicted with some one of the insanities; one in every 500 has epilepsy, and it is common belief that neurasthenia is on the increase. Diseases of the nervous system are naturally increasing with the increasing population. Whether this is a relative increase or not is not definitely proven. So far as the insanities are concerned, there seems to be little doubt that they are not only relatively but absolutely increasing. With respect to this latter belief, however, it should be remembered that the increase in the material comforts afforded patients suffering from insanity is tending to encourage the community to send their semi-dependent members to institutions and thus escape the individual cost of their care. This makes an apparent increase in the proportion of insanity, for many cases in this manner enter into statistics which would not otherwise be counted. The complex conditions of modern civilization are causative in bringing about a certain amount of breakdown of the nervous system, and the keen competition for subsistence and for luxuries also tends to increase these evils.

Nervous diseases present a greater diversity of symptoms than disease of any other organ-system of the body. Over 200 divisions have been made, and this number is subject to constant revision. The nervous system is the most highly developed and most intricate part of the body; hence nervous diseases present a greater complexity than any others. At the same time, so far as the neuroses are concerned, their accurate determinatio is a matter of very precise anatomical knowledge. This gives to the study of them a peculiar fascination. Nervous diseases are further characterized by their extreme severity. Other organs of the body, when diseased, recover their functions in a comparatively short time. Nerve-function, when disturbed, recovers very slowly. Chemically, nervous tissue is extremely complex and much time is necessary to reconstruct it after injury. This is particularly true for mental diseases. Years and months are

necessary for recovery, when weeks and days are occupied in the restoratior of non-nervous structures. Economically, nervous diseases are of serious effect, frequently depriving the community of wage-earners without eliminating them, so that they become burdens; and they contribute to swell their own ranks by the added stress they cause to the community which must support them. The great majority of chronic invalids are those suffering from nervous ailments. Idiots, imbeciles, the insane, epileptic, paralytic, and criminal make up a large class of parasites. The study of economic conditions due to disorders of nervous structures is of wide and practical import. It is the largest and most important chapter in social economics.

One of the most important agents in reducing the amount of nervous disease is hygienic living, and a greatly increased amount of general information bearing on the part played by alcohol and other poisons in the development of nervous affections. All things considered, it seems highly probable that there is a relative decrease in nervous diseases in the community. It is highly desirable that in the primary schools, high schools, and colleges, more attention should be paid to the education that fits people better for the conditions with which they are to struggle in after years. Physical exercise, gymnastics, open-air play, nature-study, general rules of hygienic eating, of hygienic clothing, and the general principles of preventive medicine should enter into the curriculum of every school for both sexes. All this is being provided for wisely in most of the communities of the United States, and there is every reason to suppose that coming generations will be much better fitted physically to stand nervous stress than their predecessors.

Text-books on nervous disorders are numerous. A few of the more important recent works are here mentioned. Reference works: 'Jahresbericht über die Fortschritte in der Neurologie und Psychiatrie,' the most important bibliographic work published. Nothnagel's 'Specielle Pathologie und Therapie' contains the most recent series of monographs bearing on nervous disorders. Brourdel's 'Traité de Médécin' is one of the best recent French collections. Albutt's 'System of Medicine' is the best of the recent English systems. Valuable individual works on diseases of the nervous system are those of Starr, Dana, Church and Peterson, Gowers, Dejerine, and Oppenheim. On mental disorders Ballét's 'Traité de Pathologie Mentale' (1904) is one of the most comprehensive as well as most recent. Kraepelin, Weygandt, and Ziehen are German authors in favor; Berkeley, Defendort, Peterson, and Haines are well-known American authorities; Maudsley, Mercier, Clouston, and Bevan Lewis are among the foremost English writers of a generation past; Bianchi, in Italy, and Muratow, in Russia, are other well-known authors on nervous diseases. See BRAIN; INSANITY; NERVOUSNESS; NERVOUS SYSTEM, EVOLUTION OF THE; NEUROSIS; NERVOUS SYSTEM, TRAUMATIC AFFECTIONS OF THE; PSYCHIATRY; PSYCHOSIS.

Nervous System, Evolution of the. The nervous system is that part of the body which has developed most particularly the function of adapting the different organs of the body to their environment. It is the great regulator of all the physiological processes. It may be said to consist of two parts, that portion which has to do with the reception of impulses from without, in general spoken of as the sensory nervous system, and that portion which, in response to the incoming impulses, causes some form of adaptation in answer. Such adaptations are often of a muscular character, and the motor-nervous structures are concerned in bringing about such relationship. The human nervous system is fundamentally arranged on this plan, but while theoretically so simple in organization, practically and anatomically it is an extremely complex and complicated series of structures. This complexity is the result of untold ages of development; but a study of the nervous system in a number of the lower forms of life, as well as the study of the various nerve-structures of man himself in their development from the fœtal stage, has enabled the student of the human nervous system to trace the gradual steps of its evolution.

Plants are considered not to possess any nervous structures, yet the protoplasm responds to many forms of stimuli in much the same manner as the protoplasm of more highly developed living things. In a few plants, Venus' fly-trap, the sensitive plant, etc., there are found certain cells in the midribs of the leaf and in the stem, in which the protoplasm differs from that of other plants. They do not possess special nervous structures, but they are cells in which the protoplasm seems to possess special nervous conductive properties. In many of the lowest animals no known nervous structures have been found, but even in the very simplest animals the prototypes or forerunners of human nerve-structures are known to occur. In these animals the simple nerve-unit or neuron is found. In its simplest form this neuron consists of a strand of nervous tisue, a nerve-fibre, in some portion of which an enlargement or nerve-cell (so called) occurs. From the nerve-cell (or station, as it were) the fibre usually passes out in two directions, becoming attenuated in its passage and, branching or not, finally terminates in extremely fine processes (dendrites), which in different animals widely vary. One branch of this neuron is usually found in the periphery of the animal body, and may be spoken of as the incoming or sensory part of the structure; the other is frequently distributed to the muscles of the body. As the animals rise in the scale of complexity, this most primitive condition becomes modified, and a neuron of distinctly sensitive nature develops, which is brought in contact by the end-filaments of the neuron-branches with a similar motor neuron.

Such simple arrangements are found in animals of the very lowest organization, polyps, sponges, etc. In higher animals collections of these neurons form ganglia. These ganglia, at first isolated, become co-ordinated and grouped until as in the insects, for instance, a double chain of ganglia is found from in front of the mouth to the anus, arranged along the abdomen. These ganglia are connected by cables of nerve-fibres, and to and from each ganglion sensory and motor fibres pass, and thus the entire nervous system is brought into co-ordination. In thought it is but a step from the ventral double chain of ganglia in the insects to the solid spinal cord of the mammals with its ganglionic enlargements, constituting the medulla and brain

(see BRAIN), but it has taken many ages to bring about this integration. Theoretically, the nervous structure of the lowest mammals, *Amphioxus* and *Petromyzon,* are of the simplest type, a trifle more advanced than the insect double chain; but in the study of the nerve-structures of these lowest forms glimmerings of the complex nervous system of man are to be found. The homologues of the much diversified and complex spinal cord and brain in man are present in the primitive conditions in these animals.

While the developmental stages of the growth of the nervous system to its present complexity may be thus summarized, the details of the different forms are intricate, and only on philosophical grounds can they be thus described. In the lowest *Infusoria* structures that are definitely nervous in their function, and resembling nervous tissue in their forms, are first met with. These are located almost exclusively on the periphery of the body. In the bell-animalcules (*Vorticella, Stentor,* etc.) a mixed form of neuromuscular cells is found. These possess the combined functions of these two types of tissue. In the sea-anemones and polyps similar nervous structures are found and small ganglionic masses are present. Starfish possess a comparatively complex nervous system. Each arm of the starfish has a small ganglion near the mouth, and a nervous cord passing down the arm. The ganglia are farther connected by special nerve-fibres, bringing about an integration of nervous impulses. In the mollusks (snails, oysters, clams, etc.) the nervous system consists of a ring of ganglia surrounding the œsophagus; one above is larger and by some is spoken of as a brain, but it is not homologous with the brain of mammals in any sense. Communicating fibres pass to the foot, and to the breathing apparatus. In the worms the nervous system is still more complex. An enlarged double bilateral ganglionic mass at the head of the animal constitutes the brain; special offshoots pass to nervous structures in the eyes on each side; double cords pass backward, connecting the brain with paired ganglia, which may be fused into one mass or may be separated and connected by commissural fibres. From the ganglionic enlargements fibres pass out to the periphery of the body. This form of nervous system represents in skeleton what the more complicated mammalian system is to become. It is bilateral and is segmented, or metameric. The bilateral character of the mammalian nervous system remains throughout, with but slight fusion; the metameric character, however, undergoes many changes by the fusing together of ganglionic masses and their later distortion. The separate ganglionic mass in the worms entails greater individual independence. Thus if the head of a centipede be cut off, the legs will still cause the animal to run. Ants, flies, and butterflies will move about aimlessly for some time after the head is cut off. The head-ganglion in the ant is much more complex than in many other insects, showing in some measure by its structure the more highly developed character of this animal's "brain-ganglion."

The transition from lower to higher types of nervous system is found in one of the lowest of the vertebrates, the *Amphioxus.* In the lower forms the ganglionic masses and their connecting cords are located for the most part in the lower or ventral portion of the body, and the ganglia and fibres are distinct. In the vertebrate type the nervous system becomes dorsal, and the ganglia and fibres become fused into a long cord, or cerebro-spinal axis, which lies protected in the bony cavities of the skull and spinal cord. Certain accumulations of ganglionic centres occur and give a varying form in the different animals, and throughout the entire cerebro-spinal axis there runs a small cavity. In the head, or cephalic end, the brain is located, the ganglion-cells, or gray matter, being usually situated on the outside of the mass, the connecting and collecting fibres, white matter, on the inside. In the lower or cord portion, the gray masses come to lie on the inside of the structure and are partly surrounded by the fibres (see SPINAL CORD.) The ganglionic masses in the cord remain isolated, but much shifted in their position, coming to assume in the highest types the character of rods or pyramids of gray matter embedded in the cord. From the entire nerve-axis fibres pass out and are regularly paired, bringing all parts of the body into close nervous contact by intercommunicating nerve-fibres. In *Amphioxus* only the foreshadowings of the arrangements in higher vertebrates may be seen, but the work of Edinger, Kupfer, His, Retzius, and others has shown that most of the structures of the higher animals are found in this low animal in their simplest forms. In the fishes the brain-hemispheres begin to show more advanced stages. The olfactory nerves and bulbs are very prominent. The optic lobes are small, and the presence of a cerebellum is only indicated. In the amphibians, frogs, toads, salamanders, and the reptilians, snakes, etc., the hemispheres are prominent, and a certain degree of complexity of their minute anatomy is evident. The olfactory lobes are still very large, the cerebellum is very poorly developed, and the spinal cord is extremely simple in structure. The pyramidal tracts are not yet characteristic, but fibre-systems are present, passing from the brain to the cord. The spinal cord remains, however, a somewhat independent organ. In the fishes a sensory spinal fibre-system is probably found. With the birds the more characteristic higher-type brain begins to show itself. Its hemispheres have convolutions resembling somewhat in type those of higher forms. The cerebellum is well developed, and shows the characteristic histological structure of more highly evoluted animals. The spinal cord has well-marked pyramidal motor tracts and a differentiated sensory tract. Finally in the mammals practically all of the structures of the human brain are present, although great variations in the size and complexity of the different parts are to be noted. The brain of man differs from that of the lower animals not so much in the matter of size or weight, although it is relatively large and heavy, as by reason of the almost infinite number of connecting or association fibres. These bring all parts of the nervous system into relation, and permit of the endless variety of thought-constructions that go to make up man in his social conditions. In man, moreover, the hemispheres become relatively much larger than the other parts of the brain, and by reason of their many fissures and convolutions make very wide areas in which countless nerve-

cells develop. These hemispheres lie over the other parts of the brain. Throughout the entire animal series a certain evolution in localization takes place. Functions which in lower forms are generalized, and can be assumed by any part of the nervous system, in higher animals become specialized, and are relegated to certain particular organs. Thus it is found that in animals in which the sense of smell is extremely important large olfactory lobes are present; and conversely, animals so situated as not to possess certain organs do not develop certain nervous structures. The eyeless animals of caves have usually small optic lobes; the footless dolphins show small pyramidal (motor) tracts in their spinal cords, etc.

In the nervous system are illustrated very thoroughly the general principles of evolution as seen in its broadest aspects, and the development of the richly convoluted and highly complex brain is the index of the superior mental power of the human race. Consult: Beaunis, 'L'Evolution du Systeme Nerveux' (1890), which gives a simple account of the general structural changes in the nervous system throughout animals; Edinger, 'Bau der Nervösen Centralorgane' (6th ed. 1903); Cajal, 'Les Nouvelles Idées sur la Structure du Systeme nerveux' (1895); Koelliker, 'Handbuch der Gewebelehre des Menschen' (1896), for minute anatomy. For the most comprehensive works on the human nervous system, Dejerine, 'Anatomie du Systeme Nerveux' (1900), and Van Gehuchten, 'Anatomie du Systeme Nerveux' (3d ed. 1903). See ANATOMY; BRAIN.

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Nervous System, Traumatic Affections of the. Accident and injury play a large role in the development of affections of the nervous system. These forms of disease, or disorder, may be grouped under two general heads, organic affections and functional affections, the dividing line between some forms of each being very obscure. Affections of the peripheral nerves are among the commonest of the organic accidental injuries. Thus, pressure of a crutch under the arm, the use of the crutch being necessitated by a broken leg, often produces a paralysis of the muscles of the arm. Other forms of peripheral palsies result from wounds of the arm and forearm whereby a nerve is cut, either by an instrument that penetrates the skin or by a splinter of bone from a fractured limb. Paralysis of one half of the body (hemiplegia) sometimes follows severe injury to the head. Such injuries frequently result from football accidents, from falls during drunkenness, from collisions, being thrown from a horse or vehicle, etc. Fractures of the spinal column often result in death, due to injury of the spinal cord; and if death does not result immediately, paralysis of the entire body below the site of the fracture (paraplegia) results. Lesions of the nervous system resulting from gunshot injuries are very common in times of war and constitute a very important chapter in military surgery. Such injuries usually cause either paralysis of different parts of the body, resulting from division of the nerve-fibres, or severe neuralgic pain due to irritation of the sensory nerves. Occasionally epilepsy is caused by accidental injury to the head, especially injury to the child's head during birth. One of the most interesting chapters in the history of traumatic affections of the nervous system is that of "traumatic neurasthenia," or "traumatic neuroses." These have been frequently classified under the head of "spinal concussion," "railway spine," "Erichsen's disease," etc. The most characteristic features of this affection were pointed out by Charcot, who allied it with neurasthenia and hysteria; and at the present time it is usual to speak of three classes of these conditions: (1) affections of a purely surgical nature; (2) traumatic hysteria; (3) traumatic neurasthenia. In a severe railway accident, for instance, any one of these forms may be present, and combinations of two or three are not unusual. The neurasthenia which may arise from such accidents is of a nature precisely similar to neurasthenia due to other causes. It is characteristic, however, that many of these neurasthenics recover when damages are collected from the railroad; some, however, persist and there is no doubt that the affection is a real one in many instances, and not simulated. At the same time, it should not be forgotten that many people grossly exaggerate their symptoms; moreover, there are certain parasites in the community who make it a business to sue railway and other corporations on the basis of alleged traumatic disease. Hysteria resulting from traumatism is of the same nature as ordinary hysteria, and is governed by the same general laws of this disease when due to other causes. It is important to emphasize the fact, not only to the layman, but to the professional man, that traumatic neurasthenia and traumatic hysteria are real diseases, and that their consequences may be serious and disabling. Each case needs special treatment, and in all cases in which litigation occurs there should be thorough investigation by competent medical experts, as well as trial by jury to determine the degree of disability on its merits. Consult: Peterson and Haines, 'Text-book of Legal Medicine' (1904); Bailey, 'Accident and Injury.'

Nervousness. If one were to ask half a dozen persons calling themselves nervous to define what they mean by their nervousness, he would find it hard to get thereby a general and comprehensive definition, for each would fall to describing his particular variety of nervousness. The nervous business man feels in a perpetual hurry. He is impatient and restless while waiting for his car or for his luncheon. He eats quickly, talks rapidly, and when he has a chance to rest he fidgets. At night he tosses and thinks for an hour or two before sleeping; but, instead of thinking consecutively his ideas flash around in a distracting circle that leads to no conclusion. The nervous woman of leisure starts at the slightest noise; she feels bright and like herself during any exciting pleasure, but has the blues and is morbidly depressed when life is dull. She has headaches, and moods in which she wants to scream. The overworked nervous student broods over his studies, cannot fasten his attention on his work, and what he has once known well he fears he has forgotten, and he expects to fail in his examinations. The young girl who is nervous about playing or reciting before an audience finds that her heart beats furiously; her hands are icy and stiff, and when she sits down at the piano the notes dance wildly before her

eyes. The nervous mother or housekeeper is troubled by her irritability. She is distracted, forgets where she puts things and cannot remember what she started to do. At night she excuses her "good cry" as a relief to her nerves.

All such people agree that nerves are the bane of modern civilization, and it seems to be taken for granted that nerves are a new development of the human anatomy. When national comparisons are made, Americans will generally admit, in fact claim, that they are the most nervous of nations. To be nervous seems to imply the possession of a finer sensibility, a greater responsibility in affairs, and a more strenuous and enviable mode of living. Hence the afflicted dwell with relish upon their symptoms, with a lurking contempt for such as do not manifest the like.

To have nerve, however, is quite a different thing from having "nerves." Nerve implies the ability to bring all one's powers under control of the will, to keep steady in trial and danger, calm when others are in panic, and buoyant through any crisis. This modern use of the word nerve and the common supposition that the nerves which play such pranks with man's mind and temper and disposition are all in some way under control of the will illustrates the vagueness of general knowledge concerning the nervous system and its relation to nervousness.

The absolute control of man's nerves is no more a thing of his will than is the act of sneezing. The power that he calls his will is but the steadily directed training of portions of his nervous system to act in a desired way according to certain decisions. The most pitiful sight in life is a man who "has no will," who has noble impulses and high desires with no disciplined nervous machinery to carry them out. The men and women who are known to have that will power which carries them through ordeals, and who are productive in their activities, are those who have been accustomed to "do noble things, not dream them all day long." As all success in life, as well as every pleasure of mind or body, depends on a well-conditioned nervous system, it is a matter of highest moment to know how to preserve, train, and care for one's "nerves."

Not every man is born equal in his nervous equipment. Some inherit an excellent nervous system, which they may dissipate with unwise living, or may husband and improve. Others have very little vigor of the nervous system, but by careful training and right living they spend only what nervous force they can spare. With a poor heritage, in the strenuousness of city life, and sharing the prevalent ignorance concerning the nervous forces, a man may feel that by excessive work he is making a brave and noble struggle to succeed, when in reality he is spending his nervous capital, and at 40 will be a wreck. The nervous capital is the quality of nervous energy with which one was born, plus the quality he has gained by training. The question of quantity concerns only the average amount of nerve-work one is able to do in a day without fatigue too great for recuperation.

Every spoken or written word, every plan, every carefully executed order that takes thought, every act of attention, and every bit of creative work means expenditure of nervous energy. Rest, sleep, recreation, and fresh air enable the nervous system to renew in a few hours all that it has lost, with ability gained to do the same kind of work the next day with less of voluntary effort, and consequently less fatigue.

The slowly accumulating nervous power that shows itself in increased accuracy and judgment makes men successful and prevents nervousness. Too many girls and boys, in their student days, in their social or university careers, in their early business ambitions, are so anxious to succeed quickly, that they spend more of their nervous capital than can come back to them in the time allowed for sleep and recreation, until finally they find themselves nervous bankrupts. "Time is money" may well be paraphrased, "Nerves are money," and they are also power and success.

In no part of the body are the effects of heredity so marked as in the nervous system, but most conclusions regarding this are based on *post-hoc* reasoning. It can never be shown that, because two highly nervous, excitable, or hysterical persons marry, their children must have the same strain; for a healthful environment and good physical and mental training can overcome the tendency to lack of nervous control. Neither can it be assumed that the children of two calm, well-balanced persons, of good nervous force, will grow up to be like their parents; for disease, overwork, and dissipation may ruin the best nervous organization. The chances are, however, that the same environment and training which have helped to exaggerate the nervousness of parents will also surround and affect their children, as it is equally probable that the wise and healthful training which has developed good nervous stock in parents will be passed on to their offspring.

Neurologists term this inborn tendency in the nervous system to give way under stress, the neuropathic tendency, or nervousness. They mean that, while no actual nervous disease is inherited, yet under the stress of habits and environment the nervous system fails to meet the demands made upon it. A man with this neuropathic tendency who drinks even moderately usually becomes nervous and less capable, where another might suffer almost no ill effects. Two students may smoke cigarettes incessantly, and one develop shaky muscles, an irritable heart, dyspepsia, and nervous breakdown; the other feeling no ill effects. A certain percentage of telegraphers, typewriters, writers with the pen, pianists, tailors, ballet-dancers, etc., develop occupation-neuroses (see OCCUPATION, HYGIENE OF), with muscular cramps and consequent disability, by reason of the extra burden put upon a deficient nervous inheritance.

The inheritance of a sound nervous organization means that a child is born with sufficient nervous energy to control its body and not so much as to stimulate it to excess. Perfect health in a mother during pregnancy means a valuable asset for her child's nervous system. Shock, fatigue, infectious disease in the mother may even stop the child's nervous development, and cause the babe to be born an imbecile. A normal infant at birth has the mechanism of its nervous system definitely laid out though wholly undeveloped. All growth comes through repeated experiences, which begin with the first day of life, and on that day the training of the nervous sys-

tem should begin. Clock-like regularity in the hours of eating and sleeping is the first step in the healthful training of an infant's nervous system. By control of the involuntary start on hearing loud sounds, a child may be so trained as to be spared much nervousness when he grows up. Parents, by word and example, should teach their children to work with concentrated attention in spite of distracting sounds. It is the total lack of training that makes it impossible for so many nervous people to inhibit their reflex actions. They tremble, shudder, start, exclaim, are disturbed in their work, wakeful at night, simply because they have always allowed their nerves to respond to trifling stimuli, instead of inhibiting the responses. All mechanical actions, all brain actions tend by repetition to become automatic. The muscle-worker rarely suffers from nervousness. But in the brain-worker the establishment of new connections brings great nervetire. So the expenditure of nervous energy in forming new nerve-connections, receiving new impressions, etc., tends to make the most agreeable occupations exhausting. Let it be remembered by the older generations, and taught to the younger, that the training and economizing of nerve-force are vitally important to health and efficiency, and that the great workers achieve their ends by that very quality of nervous energy which, if dissipated, degenerates into nervousness.

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Nesbit, nĕz'bĭt, **E.** See BLAND, EDITH NESBIT.

Nesbit Moor, in British history, a battle fought 7 May 1402, between the Scotch, under Sir P. Hepburn, and the English, under the Earls of Percy and March. The Scots were defeated, their leaders killed, the most of them taken prisoners.

Nesr, in Arabian mythology, an idol in the form of a vulture, worshipped by the tribe of Hemyer.

Ness, Loch, lŏH nĕs, Scotland, a lake of Inverness-shire, on the line of the Caledonian Canal. It is long and narrow, stretching southwest and northeast about 22 miles, with a fairly uniform breadth of about a mile, and a maximum depth of 780 feet. Its northeastern extremity is about six miles from Inverness. Fort Augustus is situated at its southwest end. It occupies the centre of the valley of Glenmore, and is enclosed by steep and often finely wooded hills, about 1,000 feet high. The outlet is by the Ness into the Moray Firth.

Nesselrode, nĕs'sĕl-rō-dė, **Karl Robert,** COUNT, Russian statesman: b. Lisbon 14 Dec. 1780; d. Saint Petersburg 23 March 1862. His father was Russian ambassador to Portugal, and the son also, at an early period, entered the diplomatic service, and in 1807 was made councillor of the Russian embassy at Paris. He succeeded in detaching Russia from the Austrian alliance, and was present at the important conferences between Napoleon, Alexander I., and the German princes, at Erfurt in 1808. He gained immense influence over Alexander's mind; was made chancellor of the empire, and dictated its foreign policy; followed the emperor to France in 1814, and signed the Quadruple Alliance; and took part in the Congress of Vienna. He was one of the chief formers of the Holy Alliance, which made Russia virtually supreme in Europe. He became minister of foreign affairs in 1816, and took part at the congresses of Aix-la-Chapelle, Troppau, Laibach, and Verona. Nesselrode's influence was considerably limited under Nicholas I., and he strove in vain to avert the war which broke out in 1853. After the accession of Alexander II., and the signing of the Treaty of Paris in 1856, Nesselrode retired from the foreign office, but continued in the chancellorship, and also held a seat in the Ministerial Council. His autobiography appeared in 1866.

Nessus, nĕs'ŭs, in Greek mythology, a centaur whom Hercules ordered to carry his wife Deïanira across a river. The centaur illtreated the woman, and Hercules shot him with a poisoned arrow. Nessus, in revenge, gave Deïanira his tunic, saying whomsoever she gave it to would love her exclusively. Deïanira gave it to her husband, who was poisoned and after enduring agony, threw himself on a funeral pile and was consumed.

Nestle, Christof Eberhard, German scholar: b. Stuttgart 1 May 1851. He was educated at Tübingen and Leipsic and was tutor at the former university 1877–80, and professor at Ulm 1880–90, and again, 1893–8. Since 1878 he has been professor at Maulbronn, Würtemberg. He has published 'Die israelitischen Eigennamen' (1876); 'Psalterium Tetraglottum' (1879); 'Syriac Grammar' (Lat. 1891, Ger. 1888, Eng. 1889); 'Septuagintastudien' (1886–99); 'Marginalien und Materialien' (1893); etc.

Nes'tor, Russian monk and author, of the 11th century. He was of the Cave Monastery at Kiev, and wrote an account of the martyrs Boris and Gleb, and a 'Life' of Theodosius, a former abbot of his monastery. For a long time he was regarded as at least the original author of the so-called 'Chronicle of Nestor,' the most important of the early authorities for Russian history, but later investigations have proved the supposition erroneous. The 'Chronicle,' perhaps the work of Abbot Silvester, gives an account of Slavonic history in the form of annals for the period 850–1110 A.D., the last 40 years being from a contemporary viewpoint. For the preceding time, use is made of the Byzantine historians, the Bible, the Apocrypha, traditions, biographies and legends of saints and the records of monasteries, etc. There are various translations into German by Schlözer (as far as 980 only); in his 'Russische Annalen' (1802–9); into French by Léger (1884).

Nestor, in Greek legend, one of the heroes at Troy distinguished for his great age, experience, and wisdom, as well as for his mild and persuasive eloquence. These are the qualities Homer has attributed to him in the Iliad. He was the son of Neleus, king of Pylos, and was born at Gerenia, in Messenia. He succeeded his father as king of Pylos. In his youth and manhood he distinguished himself by many bold exploits, and early acquired the reputation of a prudent counsellor and persuasive orator. Though he had lived through two generations when the expedition to Troy was undertaken he nevertheless took part in it, and conducted the forces under his command in 20 vessels to

Troy. On account of his extreme age he did not take a personal action in the encounters before the city. The part which is attributed to him in the Iliad is that of an experienced counsellor. He had several sons and daughters, but they are not distinguished in history. After Nestor had outlived three generations he died quietly at Pylos, where, in the time of Pausanias, the inhabitants pretended to distinguish his dwelling and his grave.

Nesto'rianism, the theory of the Incarnation of Jesus Christ taught by the Nestorians or followers of Nestorius. Nestorius was a presbyter of Antioch who in 428 was made patriarch of Constantinople and was charged with teaching that there were two persons in Jesus Christ, of which one is the word of God, and the other the man Jesus, and that Mary his mother ought not to be styled mother of God (Theotokos) but mother of Christ (Christotokos). Cyril, patriarch of Alexandria, accordingly accused him of teaching the dual personality of Christ, a view which was formally condemned and anathematized by the Third Council of Ephesus, 431. He was deposed, driven from one place to another and met with a miserable death in 440. The controversy lasted for two centuries. In 435 the Nestorians who had organized themselves into a church in Syria took refuge from the persecutions of the Orthodox church in Persia, Mesopotamia and Arabia, assuming the title of Chaldæan Christians. At the Council of Seleucia (498) the Persian church clearly formulated this dogma in opposition to the teaching of the Catholic Church. These views flourished in Antioch, Edessa and Nisibis, and their adherents were the fosterers of learning in history, philosophy and medicine, and under the Arabian domination were often raised to high posts in the government. Tamerlane afterward desolated the Nestorian Church throughout almost all Asia, so that only a remnant escaped to the mountains of Kurdistan. Under Popes Alexander III., Innocent IV., and Nicholas IV., some attempt was made in the 16th century to effect a union with the Roman Church, in consequence of which the United Nestorians separated from the main body of the Chaldæan Christians. These separatists are numbered at some 20,000. They acknowledge the primacy of Rome, but use a Greek liturgy. Their patriarch has his see at Diarbekir, Asiatic Turkey. The Non-United Nestorians in Mesopotamia, Persia and Syria celebrate the sacraments of baptism and the Lord's Supper but do not teach Transubstantiation; they do not impose celibacy on their clergy; they number some 150,000 souls. The Nestorians of India are called Christians of Saint Thomas; in 1599 they acknowledged the primacy of the Roman see. Consult: Badger, 'The Nestorians and their Rituals' (1852); Rae, 'The Syrian Church in India' (1892).

Nesto'rius. See NESTORIANISM.

Nests of Birds, the receptacles prepared by birds for the holding and security of their eggs and young. The offspring of birds, as of all the animals lower in rank than they, begin life in the very immature state we call eggs. Those of lower animals are, however, protected from harm, when protected at all, by being buried under water or in the ground, or otherwise concealed and shielded. (See EGG; NIDIFICATION.) The eggs of birds, however, are few in number, larger in proportion, and more advanced in development than those of fishes, amphibians or reptiles, and are encased in very fragile shells, the rupture of which would be fatal to the enclosed embryo; they are never (with a single exception) buried out of harm's way; and they require a comparatively high degree of warmth, continuously applied, in order to mature successfully into living and energetic young. (See EGG.) To meet these complicated conditions of success great care is necessary on the part of the parent-birds; and the necessity for this care increases in proportion to the superiority of organization and development of the bird,— a matter of wide range in the class. The young of the higher forms, as hawks and thrushes, would inevitably perish under the limited care that suffices for such lower forms as the seafowl. In this view birds are divisible into two classes: first, those whose young are developed within the egg, that is before hatching, to such a point that they are able as soon as freed from the shell to run about, pick up their food and to a great degree take care of themselves; second, those hatched before they have reached this state of advancement, and which hence must be fed, protected and guarded by their parents until they have completed their development to the point of self-care. Parental preparations for the former need have regard only to the proper incubation of the eggs; for the latter it must be extended to the safety and comfort of the young for a period after they have hatched greater or less according to their helplessness, which varies with the degree of organization. It is among birds of the highest organization, therefore, that complete and elaborate nests are alone to be found, because there only are they required as cradles and homes for the young. The lowest seafowl, such as penguins and auks, make no nest whatever, depositing only a single egg on some cliff-ledge or sea-islet, almost inaccessible to enemies, and covering it with their warm bodies until the young one hatches, when it is immediately ready to go into the water and fish for itself. The great company of shore-breeding birds, gulls, sandpipers, etc., need do nothing more than scrape a smooth hollow among the pebbles or sea-wrack where their eggs may lie close together and not roll or be blown away. The waterfowl — rails, ducks, pelicans and others,— seeking the greater seclusion of marshes and swamps, must do a little better, making a firm raised bed of earth with a rim around it, or else a platform of reeds, etc., to keep their eggs out of the mud or water. Some of these, as the herons, cormorants and the like, have learned to make their homes in bushes and trees, and these are likely to be rather more substantial than those on the ground, to prevent their falling to pieces in the swaying of the branches, or dropping the eggs over the side or through the bottom. Similarly the great tribe of ratite, limicoline and game-birds, which breed inland on the ground, do not make nests in such sense as are those of the song-birds, but mere beds for the eggs, since these are all *Precoces,* or *Nidifugæ,* that is, of those whose chicks run about as soon as they hatch.

The higher families of birds, however, called

Altrices or *Nidicolæ*, must safeguard and nourish their young for a period after birth from the egg, and these must make a home for them which shall be durable and of such a form and finish as shall protect the helpless young from bad weather, observation and attack, and prevent their falling out. These objects are attained with a varying degree of success, but in many cases seem to be almost perfectly accomplished, and the nests resulting have added to them the finish of great beauty. Some birds' nests are marvels of skill, ingenuity and adornment; while others, perhaps made by nearly related species, are rude or slovenly.

Classifying Nests.— Several of the earlier writers on ornithology have attempted to classify birds according to their modes of nest-building. Such attempts are not without value, but they are purely artificial and of no use to the systematic ornithologist. The classification of nests may take account of their situation, means of support, shape, materials, or other characters, or of two or more of these. Taking the first-mentioned consideration as a basis we may group birds into miners, such as the kingfisher and the sand-martin; mound-builders, like the brush-turkey and scrub-pheasant of Australia; masons, which use a sort of mortar of earth or clay, including several swallows and allied birds, etc. One of the most distinctive categories is that of the borers, such as the woodpeckers and their relatives, which carve out tunnels and chambers in the trunks of trees as breeding-places. Many of the terms employed in nest classification are useful for descriptive purposes. Such are platform-nests, basket-nests, pensile nests, etc., or, as names of birds, weavers, tailors, felt-makers, etc. As a general rule birds of the same family or lesser group will agree pretty well in their style of nidification; but there are many exceptions, as for example, the North American tyrant-flycatchers.

Methods of Construction.— Birds choose for their nests the material of that kind to which they are habituated which lies nearest; and if it cannot be found will seek a good substitute, so that the nests of birds whose specific range covers a wide region will be found varied greatly and often much improved in some localities. Similarly the builders are likely to change the site when necessary, breeding in trees in wooded regions and on the ground or rocks where trees are absent. In this way certain birds have greatly modified their nesting-habits since the civilization of their habitats — notably the swallows and swifts which all over the world abandon, as a rule, their natural breeding places in hollow trees, or about rocky cliffs, and make their nests under the roofs of farm outbuildings or in bird-boxes. This adaptability extends to each species, where the nests of closely related birds vary considerably. In many families, as, notably, in the *Fringillidæ*, some species nest on the ground, others in bushes or trees: and it is hard to say which is to be considered the normal method.

Birds' nests are usually in the form of bowls, and may be formed of sticks, or weed-stems, or coarse grass, and form an immense mass, as is the case with the birds of prey, crows, or herons, one of which, the umbrette of Central Africa, makes a home large enough to fill a dumping-cart. Such great structures are likely to be used many years in succession; but few small nests outlast the winter. The hollow bed in the centre is formed by a lining of lesser and smoother substances. Small birds naturally use finer materials, and the character of the structures varies with the characteristics and habits of the birds. Some are made almost wholly of twigs, others of grass blades, others of flexible ribbons of such bark as that of the grape-vine, others of shreds of hempen fibre torn from the milk-weed and similar plants, others of a matted felt formed of the down of cat-tail flags or of ferns. Some are made in whole or in part of mud, and plastered upon rocks, either supported upon a ledge or projecting glued to the face of a cliff like a hollow bracket. Of this shape are the nests of many swifts, some of which are composed almost wholly of glutinous saliva, as is the case with that of the edible swift mentioned below. Some of the rudest nests externally are beautifully soft and smooth within; while others are exquisitely finished and adorned outside as well as in; or are intricately woven, as are the pensile hammocks of the vireos, the pouches of the Baltimore orioles, European titmouses and others, and the leaf-sewn nests of the tailor-birds and many humming-birds. In most cases the female is the architect, while the male is permitted to do little but bring materials which are often rejected by the fastidious builder. While most, especially of the smaller kinds of birds, separate into pairs and seek secluded places for their homes, others breed gregariously, as is the custom of many seafowl and most herons, pelicans, etc. Some of the land-birds, as the swallows, betray a tendency toward this; but the most remarkable case is that of the African social weaver-birds (q.v.), which actually build a roof in common, beneath which each pair of the flock establishes its individual dwelling. This strictly community life does not occur elsewhere among birds, although cases of commensalism are occasional.

Edible Nests.— Few birds' nests serve any human utility, though many are utilized by other members of the animal kingdom. One, however, is valuable as food. This is the nest of the salangane (*Collocalia fuciphaga*) and other species of swifts or swiftlets, found in the Malay Archipelago, used as an article of luxury among the Chinese. It has the shape of a common swallow's nest, is about the size of a half teacup, is found in caves, particularly in sea-cliffs, and has the appearance of fibrous gelatine or isinglass. It is composed of a mucilaginous substance secreted by special glands, and is not as was formerly thought made from a glutinous seaweed. The caves in which these swifts dwell in crowds are particularly abundant in Sumatra and Borneo, especially near the north end of the island, and are in most cases the property of wealthy owners, who get a large annual income from the hazardous occupation of securing the nests, which can be done only by climbing about the interior of the great sea-caves, holding torches and raking off the nests into little bags hung upon the end of the pike-poles. The best, which are whitish in color, and almost free from any mixture with the pure glutine from the glands in the mouth of the bird, are worth $10 to $15 a pound.

Among works dealing with the subject of birds' nests we may mention Rennie, 'Architec-

ture of Birds' (1831); Wood, 'Homes without Hands' (1865); Dixon, 'Nests and Eggs of British Birds' (1893); Newton, 'Dictionary of Birds' (1893–6) and Wallace, 'Darwinism' (1889).

ERNEST INGERSOLL.

Net, an open fabric made of hemp, jute, flax, and sometimes of cotton and other fibres. The open spaces are called meshes, and in order that these may retain their shape and size the fibres of which the net is made have to be knotted at the intersections. Nets were formerly made only by hand, but an ingenious kind of loom has for many years been in use by which the operation of netting can be performed mechanically. Nets are used for a great variety of purposes, but chiefly for fishing. The three chief kinds of nets used in fishing are the seine, the drift-net, and the trawl. The first two are very long in proportion to their breadth, and differ from one another only in the manner in which they are employed. The seine has a line of corks along one of its long borders, and a line of leaden weights along the other; so that when the net is thrown into the water it assumes a perpendicular position. The drift-net is not loaded with lead, but floats in the water. The trawl, again, is dragged along the bottom by the motion of the boat. Nets are also used to catch birds and animals, to protect crops from birds, the blossoms of trees from frost, etc. Wire nets or netting is also used for domestic purposes.

Netherlands, Kingdom of the, frequently called **Holland,** a northwestern European country with a north and western coastline of 470 miles on the North Sea, its eastern frontier bounded by Germany, and its southern by Belgium. It comprises the northern and smaller half of the numerous provinces formerly combined under the name NETHERLANDS or LOW COUNTRIES, part of which is now included in Belgium. It received its general English name of HOLLAND from its coastal provinces North and South Holland. From north to south the country has an extent of 150 miles, with a breadth from west to east of 120 miles throughout and a total land area of 12,648 square miles.

Political Divisions.—The Netherlands at the present day has nearly the original limits of the Seven United Provinces in the 16th century. The modern provinces are given in the accompanying table:

PROVINCES	Area in sq. miles	Population 1901
North Brabant	1,980	566,551
Gelderland	1,965	580,691
South Holland	1,166	1,194,463
North Holland	1,070	1,001,799
Zeeland	690	219,832
Utrecht	534	259,834
Friesland	1,282	345,004
Overyssel	1,291	343,924
Groningen	790	305,781
Drenthe	1,030	153,281
Limburg	850	292,072
	12,648	5,263,232

The Duchy of Luxemburg (q.v.) was under the sovereignty of the king of Holland, until the death of William III. in 1890 dissolved this union. The most densely peopled province is South Holland (981 per sq. m.), and the least densely peopled is Drenthe (144).

Topography and Physical Features.—The Netherlands forms the most characteristic portion of the great plain of northern and western Europe. From the middle of Belgium, a few miles northeast of Brussels, the country becomes a dead level, extending in monotonous sandy flats, through Hanover, Jutland, Holstein, and, with little interruption, through Prussia into Russia. The lowest part of this immense level, and that which has most recently emerged from the sea, is the country lying between the mouths of the Schelde and Ems. Within this distance the Rhine, joined by the Maas, Yssel, and other rivers, enters the sea through a number of arms, and sluggish, winding channels. This delta in early ages was evidently liable to perpetual change of form, as new mud-banks were deposited, old channels being blocked up, and new ones formed. In addition to this the river floods, in forming a domain of alluvial deposits, had to contend with the sea, which washed away the accumulations of mud, or covered them with sand, according to the vicissitudes of weather and season. The soil of the Netherlands shows everywhere the proofs of this struggle between the ocean and the river, in the alternation of salt and fresh water deposits. It therefore became a problem of existence with the early inhabitants to secure the natural permanence of their territorial possessions, by embankments high and strong enough to protect them under ordinary circumstances from the waves; by windmills on the embankments — a characteristic feature of Dutch landscapes — they worked the pumps which drained the enclosed lands. In consequence, the Netherlands has the appearance of an artificially constructed country, some portions of which are 16 feet below the surface of the sea, and nearly all too low for natural drainage. The whole country is divided by dikes, some of them 60 feet high, which protect portions of land from the sea, lakes, or rivers. These enclosed lands are called *polders.* On the chief dikes are roads and canals also joining the rivers, the canals generally large enough to be navigable. There are no mountains nor rocks in the Netherlands, which is popularly described as a country without mountains, wild trees, or natural springs. The only heights are the sand-hills, about 100 to 180 feet high along the coast of Holland; and a chain of low hills, of similar origin perhaps, which extend from the middle of the province of Utrecht into Gelderland.

The principal coast features are the wide estuaries of the Schelde, and of the Maas, the latter receiving the waters of the Rhine; north of the Maas the Zuider Zee, which was formed by an irruption of the sea in the beginning of the 13th century, and now covers an area of 1,200 square miles. Between the mouths of the Maas and the entrance of the Zuider Zee, a distance of 75 miles, the coast is chiefly formed of sand-hills or dunes, frequently 180 feet high, dreary and sterile to the last degree; and separating, with their broad band of irreclaimable desert, the low fertile meadows on the one side from the waves of the ocean on the other. In a line with these dunes, stretching beyond the mouth of the Zuider Zee, runs a chain of

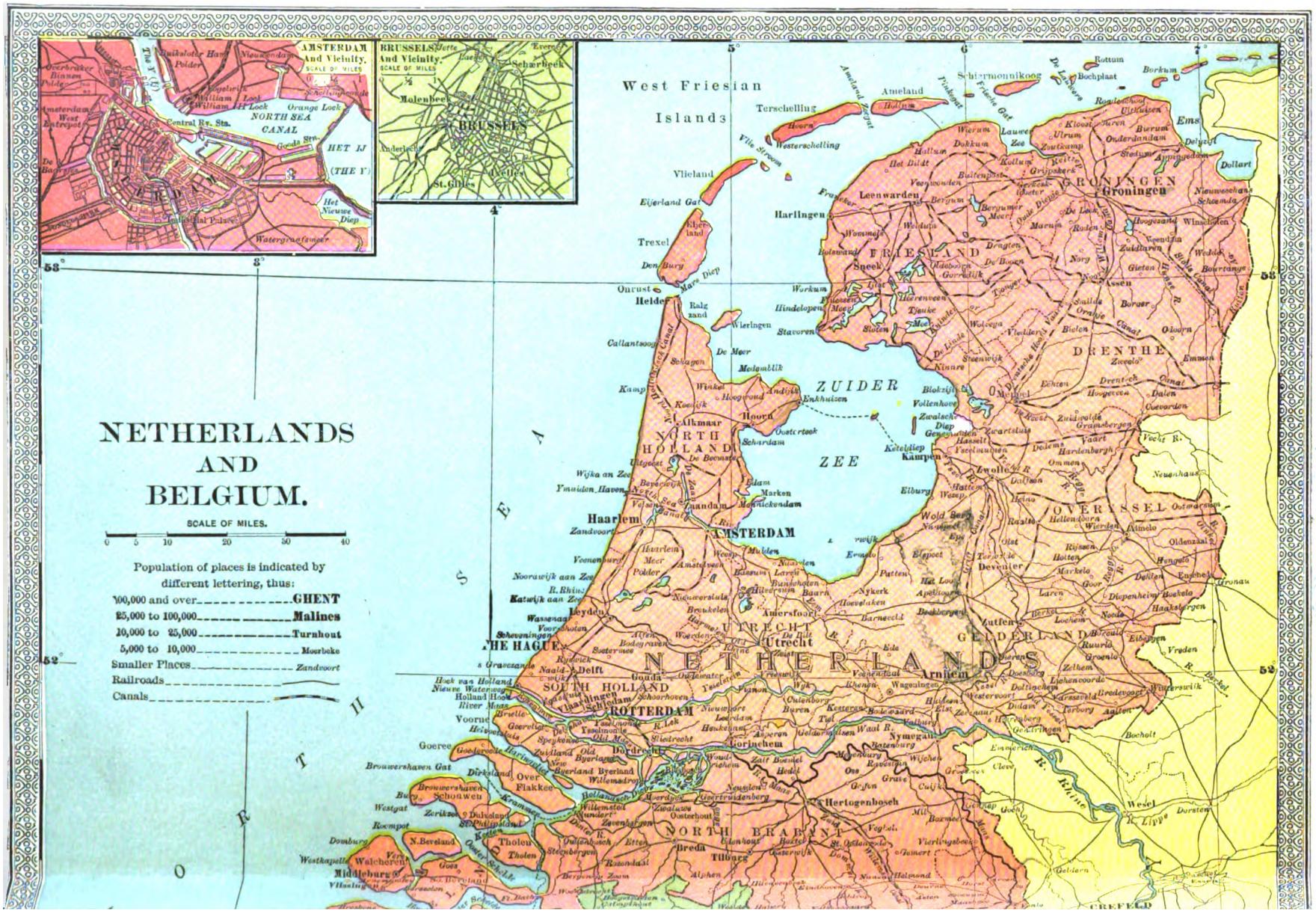
islands, namely, Texel, Vlieland, Terschelling, Ameland, etc., which seem to indicate the original line of the coast before the ocean broke in upon the low lands. The coast of Friesland, opposite to these islands, depends for its security altogether on artificial embankments. The Lauwers Zee, a deep bay on the confines of Friesland and Groningen, also owes its origin to an irruption of the ocean; and again the Dollart, a gulf at the mouth of the Ems, between Holland and Germany, was formed about half a century later than the Zuider Zee, and by a similar convulsion, which is said to have swept away 70 villages and 100,000 people. From the left bank of the Ems extends the Bourtang morass, a vast and irreclaimable peat marsh, partly in Germany, partly in Holland; the Peel, a marsh of like nature but less extent, lies near the left bank of the Maas, on the east side of North Brabant. The work of reclaiming the waste is constantly going forward; in the provinces of North and South Holland alone about ninety lakes have been drained. The principal of these was the Lake of Haarlem, the drainage of which, begun in 1839, was completed in 1852. The draining of large portions of the Zuider Zee has been begun.

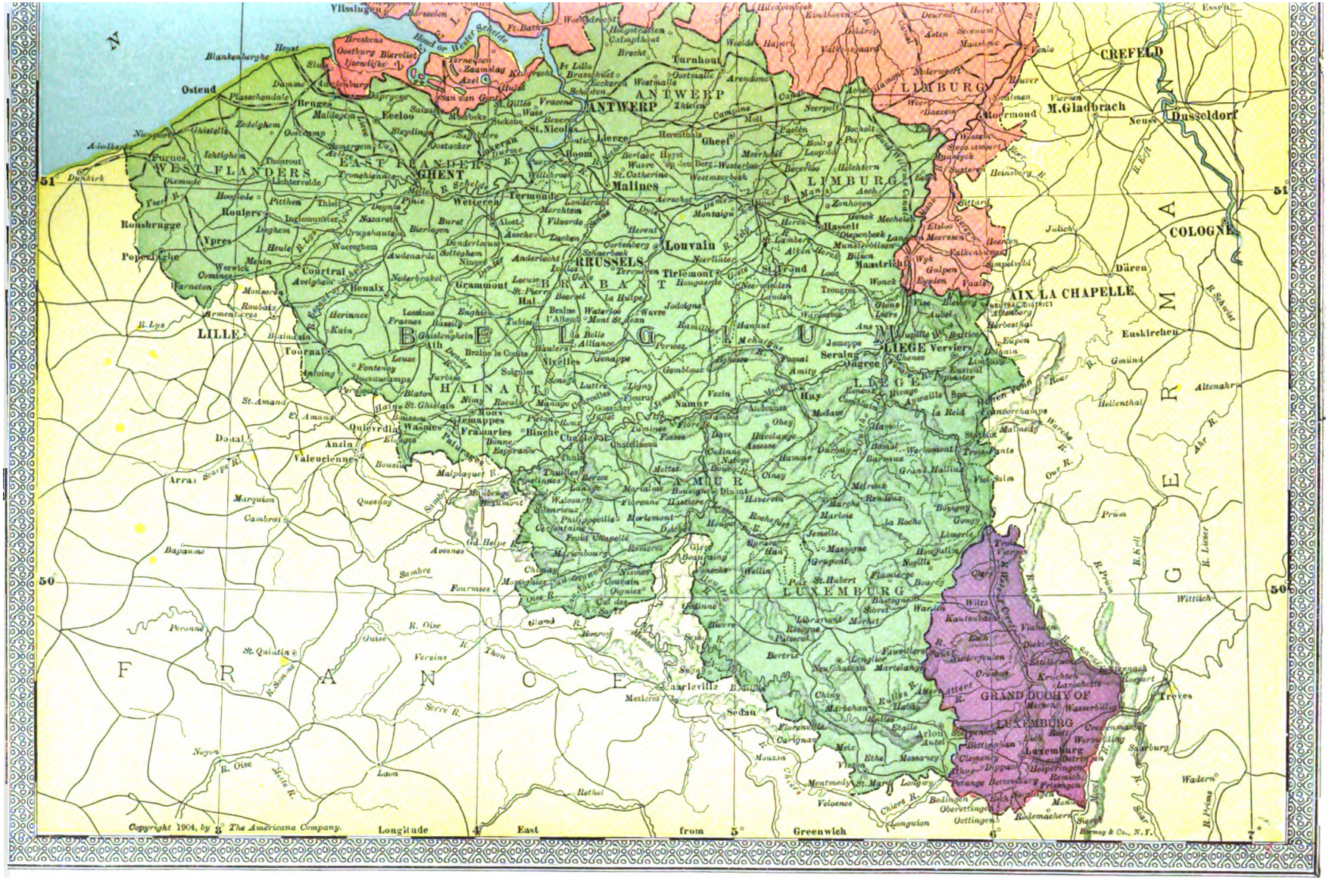
Hydrography.—The chief rivers of the Netherlands are the Rhine, Maas, Schelde, Yssel, Vecht, and Hunse. The Rhine is above half a mile wide where it enters the Netherlands; it soon divides, the south and principal arm taking the name of Waal, and uniting with the Maas, while the north arm, communicating with the Yssel, takes the name of Leck; a branch from it named the Kromme (crooked) Rhein, winds by Utrecht to the Zuider Zee, while another very diminished stream called the Old Rhine flows from Utrecht by Leyden, to the sea at Katwijk. The Maas, entering the Netherlands from Belgium, receives the Roer; of the Schelde only the mouths, the east and the west, or Old Schelde, lie within the Dutch boundary. The Yssel and Vecht, flowing from Germany, both enter the Zuider Zee by mouths at no great distance asunder. The Hunse, rising in the Bourtang Marsh, flows through Groningen to the Lauwers Zee. The canals of the Netherlands are collectively more important than the rivers. The chief is the great ship canal, 26 feet deep and 197 wide, from Wijk, on the North Sea, to Amsterdam, and connected by locks with the Zuider Zee, opened in November 1877. This great canal shortens the distance between Amsterdam and the sea to about 15 miles. The North Holland Canal allows large ships to pass between Amsterdam and the Helder, a distance of 40 miles, so as to avoid the intricate navigation of the Zuider Zee; the Winschoten Canal, also for ships, 18 miles long, connects the Dollart with Groningen; the Damster-Diep, of equal magnitude, runs from Groningen to the sea at Delfzijl; another canal connects Harlingen, on the Zuider Zee, with Groningen; the Nieuwer Sluis unites Utrecht with Amsterdam, while the latter city also communicates with Rotterdam. The Dutch canals are much used by passengers, and the slowness of the trekschuyts or boats is compensated in some measure by their punctuality. In winter their frozen surface offers convenient roads to skaters, and they are then traveled over with greater speed.

Climate.—The climate is extremely humid, changeable, and disagreeable; violent winds, with varying temperature, frequently blow from southwest or northwest, and heavy sea-fogs are driven in, which injure vegetation. The mean average annual temperature is 50° F.; 35° in January, and 65° in July; the average annual rainfall is 26 inches. The winter is severe, and the sky is almost always overcast and troubled. The bright days hardly exceed forty in the year. Low fevers visit the marshy districts in autumn, but the dry cold of winter restores the peasant's health. Although the climate is to strangers cheerless and depressing, its prejudicial effects on health are counterbalanced by good food and clothing, and habitual cleanliness; the Dutch give particular attention to these domestic safeguards, and, notwithstanding the ungenial climate in which they live, longevity is not rarer among them than elsewhere.

Agriculture, etc.—Horticulture and agriculture have been developed to a high degree of perfection, although the latter holds a subordinate place in rural industry. The soil consists chiefly of alluvial deposits. Wheat, of excellent quality, is grown only in favored portions of the south provinces. Rye, oats, and buckwheat, with horse-beans, beet, madder, and chicory, are more common crops; and tobacco is cultivated in the provinces of Gelderland, South Holland, and Utrecht; flax in Zeeland and the environs of Dortrecht, and hemp, oil-seeds, and hops in various parts of the kingdom. Culinary vegetables are cultivated on a much larger scale for home use, and also for the exportation of the seeds, which form an important article of Dutch commerce. Dutch agriculture atones in thoroughness for what it lacks in extent. The farmers are highly skilled, and to them many of the chief improvements in modern agriculture are due. The culture of flowers, and especially of flowering bulbs, has long been one of the most important industries of the country, and is of ever-increasing importance. The chief centre of this industry is Haarlem, and every year large quantities of bulbs of all kinds are exported to foreign countries. It is in stock, and dairy produce in particular, that the rural industry of the Netherlands shows its greatest strength. Their horses are remarkable for size and strength, and much sought after; and in the number and excellence of their horned cattle the Dutch stand equally high. The poultry-yard is also to the Dutch farmer a source of wealth. Bee-culture is likewise actively carried on, especially in Gelderland and Drenthe. The quantity of cheese and butter brought to market is enormous. About 2,100,000 acres are under culture, nearly 3,000,000 are pasture land, over 150,000 are devoted to gardens and orchards, some 620,000 are forest, about 1,500,000 are uncultivated heath, fully 300,000 are water and morass, and about 125,000 acres are occupied by dikes and roads.

Manufactures and Commerce.—Manufactures have never held a very important place, though the linen of the Dutch Netherlands has long held the first rank. The manufacture of woolen cloth centres in Leyden, Utrecht, and Tilburg. The distilleries of Schiedam are well known; Gouda supplies tobacco-pipes, the best


NETHERLANDS AND BELGIUM.
SCALE OF MILES.
0 5 10 20 30 40
Population of places is indicated by different lettering, thus:
100,000 and over ---------- GHENT
25,000 to 100,000 ---------- Malines
10,000 to 25,000 ---------- Turnhout
5,000 to 10,000 ---------- Moorbeke
Smaller Places ---------- Zandvoort
Railroads ----------
Canals ----------
AMSTERDAM And Vicinity. SCALE OF MILES
BRUSSELS And Vicinity. SCALE OF MILES
West Friesian Islands
NETHERLANDS
BELGIUM
NORTH SEA CANAL
ZUIDER ZEE
NORTH HOLLAND
SOUTH HOLLAND
UTRECHT
GELDERLAND
OVERYSSEL
FRIESLAND
GRONINGEN
DRENTHE
NORTH BRABANT
AMSTERDAM
THE HAGUE
ROTTERDAM
Utrecht
Arnhem
Nymegen
Leeuwarden
Groningen
Harlingen
Helder
Haarlem
Leyden
Delft
Gouda
Dordrecht
Hertogenbosch
Breda
Tilburg
Middleburg
Flushing
Terschelling
Vlieland
Texel
Ameland
Schiermonnikoog
Rottum
Borkum
Bochplaat
Ems
Dollart
Delfzyl
Amsterdam
Central Rv. Sta.
HET IJ
(THE Y)
Het Nieuwe Diep
Watergraafsmeer
Royal Palace
Oosterbuiten
Nieuwendam
Buiksloter Harb
Polder
Oranje Sluis
Oranje Lock
Schellingwoude
Oosterdok
Amsterdam West Entrepot
Oosterbuiten Binnen Polder
Molenbeek
Scharbeek
St. Gilles
Anderlecht
Ixelles
Evere
Laeken
Jette
Rotterdam
Scheveningen
Voorne
Goeree
Overflakkee
Schouwen
Duiveland
Tholen
N. Beveland
Walcheren
Goes
Vlissingen
Westkapelle
Zierikzee
Brouwershaven
Brouwershaven Gat
Westgat
Roompot
Veere
Domburg
Ter Veere Canal
Callantsoog
Schagen
Kamp
Winkel
Koedijk
Alkmaar
Hoogwoud
Andijk
Enkhuizen
Hoorn
Oosterdoek
Schardam
Wijka an Zee
Uitgeest
De Beemster
Beverwijk
Ymuiden Haven
Velsen
Zaandam
Marken
Monnickendam
Edam
Purmerend
Zandvoort
Noordwijk aan Zee
Katwijk aan Zee
Wassenaar
Voorschoten
Leyderdorp
Alphen
Bodegraven
Woerden
Oudewater
Montfoort
Amerongen
Wijk
Vianen
Culemborg
Buren
Leerdam
Heukelum
Arkem
Gorinchem
Woudrichem
Zalt Bommel
Heesch
Nymegen
Batenburg
Wageningen
Rhenen
Veenendaal
Amerongen
Doorn
Zeist
Bilthoven
Soestdyk
Baarn
Hilversum
Naarden
Muiden
Weesp
Amstelveen
Haarlem
Zandvoort
Noordwijk aan Zee
Katwijk aan Zee
Leyden
Wassenaar
Voorschoten
Scheveningen
Delft
Naaldwijk
Gouda
Schoonhoven
Vlaardingen
Schiedam
Rotterdam
Hook van Holland
Nieuwe Waterweg
Holland Hook
River Maas
Brielle
Goereesche Harbour
Zuidland
Old Byerland
Byerland
Dirksland
Over Flakkee
Willemsdrop
Hellevoetsluis
Spijkenisse
Oud Beijerland
Puttershoek
Ridderkerk
Dordrecht
Zwijndrecht
Papendrecht
Alblasserdam
Krimpen
Capelle
Vlaardingen
Schiedam
Delfshaven
Overschie
Rijswijk
Voorburg
Wassenaar
Leyden
Katwijk aan Zee
Noordwijk aan Zee
Zandvoort
Haarlem
Amsterdam
Muiden
Naarden
Hilversum
Bussum
Laren
Bunschoten
Baarn
Soestdyk
Bilthoven
Zeist
Amerongen
Doorn
Rhenen
Wageningen
Ede
Barneveld
Nykerk
Apeldoorn
Hoevelaken
Putten
Harderwijk
Elburg
Hattem
Wezep
Zwolle
Kampen
Ketelhaven
Kuinre
Blokzijl
Vollenhove
Zwartsluis
Genemuiden
Hasselt
Vaassen
Dalfsen
Ommen
Hardenberg
Dedemsvaart
Coevorden
Emmen
Zuidlaren
Norg
Roden
Assen
Borger
Gieten
Bovertange
Winschoten
Veendam
Wedde
Delfzyl
Appingedam
Dollart
Ems
Lauwerzee
Zoutkamp
Uithuizen
Bedum
Winsum
Leek
Oldeboorn
Gorredijk
Drachten
Sneek
Workum
Hindelopen
Stavoren
Lemmer
Joure
Heerenveen
Oldeberkoop
Wolvega
Vledder
Vollenhove
Blokzijl
Kuinre
Steenwijk
Meppel
Oldenzaal
Rijssen
Holten
Markelo
Delden
Enschede
Hengelo
Goor
Diepenheim
Boekelo
Haaksbergen
Lochem
Zutfen
Doesburg
Doetinchem
Terborg
Aalten
Bredevoort
Groenlo
Eibergen
Ruurlo
Vreden
Winterswijk
Lichtenvoorde
Zelhem
Didam
Zevenaar
Huissen
Elst
Westervoort
Arnhem
Velp
Rozendaal
Oosterbeek
Renkum
Wageningen
Ede
Veenendaal
Rhenen
Amerongen
Wijk
Vianen
Culemborg
Buren
Leerdam
Heukelum
Arkem
Gorinchem
Woudrichem
Zalt Bommel
Heesch
Nymegan
Batenburg
Wageningen
Rhenen
Veenendaal



BELGIUM
FRANCE
GERMANY
WEST FLANDERS
EAST FLANDERS
ANTWERP
LIMBURG
BRABANT
HAINAUT
NAMUR
LIEGE
LUXEMBURG
GRAND DUCHY OF LUXEMBURG
AIX LA CHAPELLE
COLOGNE
CREFELD
M.Gladbrach
Dusseldorf
Ostend
Bruges
Ypres
Courtrai
Tournai
LILLE
Malines
Louvain
Tirlemont
Maastricht
Hasselt
Verviers
Namur
Charleville
Sedan
Treves
Luxemburg
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Longitude East from Greenwich

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of their kind; and the same praise may be bestowed on the leather, the refined sugar of the Dutch, the pottery, bricks, tiles, glassware, and many other articles intended for continental use. Ship-building and the manufactures subsidiary to that industry are largely carried on in many places. Coal is mined in the province of Limburg, the mines chiefly belonging to the state; 312,717 tons were extracted in 1901, valued at $725,924. The commerce with the Dutch possessions in the East Indies, particularly Java, is of great and continually increasing importance. The total exports of home produce, and imports for home consumption, inclusive of bullion and specie, in 1901 were, imports $818,800,000; exports $697,200,000. The trade is chiefly with Great Britain and Germany.

Shipping, Navigation, and Fisheries.—The mercantile navy of the Netherlands on 1 Jan. 1901, numbered 638 vessels of 40 tons and upwards; 213 steamers of 268,159 tons, and 425 sailing vessels of 78,413; making a total tonnage of 346,572. The vessels entered in 1900 were 12,307 of 9,448,225 tons; cleared, 12,367 of 9,423,156 tons. The herring, oyster, and other fisheries of the North Sea employed 5,851 vessels of all kinds, manned by over 20,000 seamen. The oyster fishery yielded over 1,994 tons of oysters in 1901, while the value of the herring fishery was estimated at $2,956,138.

Railways, the Post-office, Telegraphs, etc.—The total length of railways in the Netherlands is over 1,700 miles, of which 900 miles belong to the state, and the remainder to private companies. The state railways yield an annual revenue of between $1,500,000 and $2,000,000. The post-office is well organized, and also yields a revenue in excess of the expenditure. The length of state telegraph lines in operation is about 3,800 miles. The canals have a length of over 1,900 miles (see paragraph on *Hydrography*).

Money, Weights, and Measures.—The guilder or florin, value 40 cents, is the chief denomination of money. Ten-guilder gold pieces are coined, but silver is chiefly in circulation. The French metric system of weights and measures has been adopted, the principal names being—the kilogram or *pond,* metre or *el,* kilometre or *mijl,* are or *vierkante roede,* hektare or *bunder,* stere or *wisse,* litre or *kan,* and hektolitre or *vat.*

Government, Finances, etc.—The kingdom of the Netherlands, as now constituted, is a constitutional monarchy. The executive power lies wholly with the sovereign, who shares also the work of legislation with the States-General. These consist of two chambers—the upper with 50 and the lower with 100 members—who assemble for deliberation and despatch of business at the Hague ('Sgravenhage). The members of the upper chamber are elected by the provincial states from among the most highly assessed inhabitants of the various counties; the others are elected by ballot, at the rate of one deputy to every 45,000 souls. The government is strong, and the administration in every department is simple and economical. The revenue of the Netherlands during the last few years has averaged about $56,000,000 per annum, and the expenditure about $58,000,000. The debt of the state amounts to about $485,000,000, the interest on which forms the largest branch of the expenditure. The chief items of revenue are yielded by the excise and direct and indirect taxation. The army comprises some 68,000 men (excluding officers) on a war footing, but only about 30,000 altogether in peace. It is formed partly by conscription and partly by enlistment. Substitution was abolished in 1898. The army of the East Indies is about 42,000 strong. The navy comprises 6 first-class iron-clads, 22 second-class iron-clads and cruisers, besides a number of gun-boats, torpedo-boats, training-ships, etc.

Colonies.—In addition to her European territories the Netherlands possesses a wide extent of colonies and dependencies in Asia and America, with which she carries on an extensive commerce, and which contribute materially to her greatness. Her chief Asiatic colonies are the Dutch East Indies (q.v.) comprising Java, Sumatra, part of Borneo, Celebes, and part of New Guinea, with Banca, Bali, Lombok, Sumbawa, Flores, and other islands in the Malay Archipelago; while in America she possesses Surinam or Dutch Guiana, and the West Indian islands of Curaçao, Saba, St. Eustatius, etc. Estimated area 782,863 square miles; pop. about 34,000,000.

Ethnology.—The stock to which the people belong is the Teutonic, the great majority of the inhabitants being descendants of the old Batavians. They comprise over 70 per cent of the population, and are chiefly settled in the provinces of North and South Holland, Zeeland, Utrecht, and Gelderland. The Flemings of North Brabant and Limburg, and the Frisians, inhabiting Friesland, Groningen, Drenthe, and Overyssel, form the other groups.

Population.—As given in the paragraph *Political Division* the total population in 1901 was 5,263,232, of whom 2,603,486 were males and 2,659,746 females. In 1899 there were 52,625 resident foreigners, of whom 31,865 were Germans, 14,903 Belgians, 1,307 English, and 4,550 from other countries. The emigration in 1901 was 1,874, to North America exclusively.

Education.—In respect of education the Netherlands occupy a high place among the nations of Europe. In 1857 a non-denominational primary instruction law was passed, and in 1878 this law was supplemented by another containing more stringent regulations with the view of making primary education more general. In 1900 instruction was made obligatory. An act passed in 1889 diminished public instruction and encouraged private instruction, which is now supported by the state. The cost of public primary education is borne jointly by the state and the communes, the former contributing to teachers' salaries and being responsible for one quarter of the cost of founding or purchasing schools. Above the primary schools are the middle class, secondary, and classical schools, a Polytechnic Institution at Delft, special colleges for agriculture, horticulture, etc. There are four public universities, namely, at Leyden, Utrecht, Groningen, and Amsterdam, and also a private university.

Religion.—A majority of the inhabitants belong to the Reformed Church, and Roman Catholics also are numerous. The members of all religious denominations possess, by the constitution, perfect liberty of conscience and social equality. The census returns of 1899 give the

number of Protestants as 3,067,971; of Roman Catholics, 1,798,915; Jews, 103,988; other religions, 17,926; persons not belonging to any religious body, 115,179. The Reformed Church is Presbyterian in government, while the Roman Catholics are ruled by an archbishop and four bishops.

History.—The south portion of the Low Countries belonged at the beginning of the Christian era to Belgic Gaul (see GAUL). The north portion, inhabited by the Batavians and Frisians (see those articles), formed part of Germany. The south portion as far as the Rhine was held by Rome up to 400 A.D., after which it came under the rule of the Franks, as did also subsequently the rest of the country. In the 11th century the territory comprised in the present kingdoms of Belgium and the Netherlands formed a number of counties, marquisates, and duchies corresponding more or less with the modern provinces. By the latter part of the 15th century all these had been acquired by the Duke of Burgundy, and passed to the house of Hapsburg on the marriage of the daughter of Charles the Bold of Burgundy to the son of the Emperor Frederick III. On the abdication of Charles V. in 1556 they passed to his son Philip II. of Spain (q.v.). In consequence of religious persecution in 1576 Holland and Zeeland openly rebelled, and in 1579 the five north provinces — Holland, Zeeland, Utrecht, Guelders, and Friesland — concluded the celebrated Union of Utrecht, by which they declared themselves independent of Spain. They were joined in 1580 by Overyssel, and in 1594 by Groningen. After the assassination of William of Orange, 10 July 1584, Maurice became stadtholder (governor). His victories at Nieuport and in Brabant, the bold and victorious exploits of the Dutch admirals against the navy of Philip II., the wars of France and England against Spain, and the apathy of Philip II., caused in 1609 the peace of Antwerp. But Holland had yet to go through the Thirty Years' war before its independence, now recognized by all the powers except Spain, was fully secured by the peace of Westphalia. In the middle of the 17th century the United Netherlands was the first commercial state and the first maritime power in the world, and for a long time maintained the dominion of the sea. The south provinces alternated between the rule of Spain and Austria till 1797, when they came under the power of the French republic. In 1806 Louis Napoleon became king of Holland, but in 1810 it was incorporated with the French empire. In 1814 all the provinces both of Holland and Belgium were united by the treaty of Paris to form the kingdom of the Netherlands. This arrangement lasted till 1830, when the south provinces broke away and formed the kingdom of Belgium. King Willem I. attempted to reduce the revolted provinces by force; but the great powers intervened, and finally matters were adjusted between the two countries in 1839. The king abdicated in 1840, and was succeeded by his son Willem II. (1840–1849), he being again succeeded by his son Willem III., whose reign on the whole was uneventful. Slavery was abolished in the Dutch West Indian possessions in 1863, slave-owners receiving compensation. In 1873 the Dutch began a war with the Acheenese of Sumatra, and hostilities have lingered on ever since. In 1887 the Heemskerk Liberal ministry passed a bill amending the constitution.

On 23 Nov. 1890, the king died, and was succeeded by his young daughter, Wilhelmina Helena Pauline Maria, under the regency of her mother, the Queen-dowager Emma. The year 1892 was marked by serious disturbances among the unemployed, and in 1893 the Socialists carried on a vigorous propaganda. In 1896 the franchise was extended by a new bill, which received the regent's assent. Besides the unsuccessful war against the people of Acheen, in Sumatra, the Dutch in 1894 had to face also a revolt in the island of Lombok. A Dutch force met with a serious disaster here, but soon afterward General Vetter re-established the authority of the Netherlands. In 1898 Queen Wilhelmina attained her legal majority, and formally took up the reins of government. The most notable event of 1899 was the meeting of the great Peace Conference at The Hague. (See HAGUE CONFERENCE.) In 1900 primary education was made compulsory by law. In Feb. 1901, the queen married Prince Henry of Mecklenburg-Schwerin. Consult: Amicis, 'Holland' (1893); Bernard, 'La Hollande Geographique, Ethnologique, etc.' (1900); Havard, 'In the Heart of Holland' (1880); Meldrum, 'Holland and the Hollanders' (1880); Motley, 'The Rise of the Dutch Republic' (1858), and 'History of the United Netherlands' (1869); Wood, 'Through Holland' (1877).

Netherlands, Language, Literature and Science of the. The literary language of the kingdom of the Netherlands is in English called Dutch, but by the people themselves is called Hollandsch or Nederduitsch, that is, Low Dutch. This name it receives in opposition to the Hochdeutsch or High Dutch, the literary language of modern Germany. Closely allied to the Dutch, so closely indeed as to be distinguished from it only by some orthographic and other minor differences, is the Flemish (Vlaemisch) language, spoken partly in the kingdom of Holland, but mainly in the Belgian provinces of East and West Flanders, Limburg, Antwerp and South Brabant. (See FLEMISH LANGUAGE AND LITERATURE.) Both languages belong to the Low German group of the Teutonic or Germanic branch of the Indo-European family of languages. The two languages, or rather dialects, are in fact in their early history identical and the term Flemish is applied, on the one hand, to the original form of both dialects and to the literature produced in it before it separated into these dialects; and on the other hand to that one of the two dialects which is still spoken in the parts above mentioned, and to the literature produced in it. It is only in this latter application of the term that the Flemish language and literature can be noticed separately. The non-literary Low-German dialects spoken in the Netherlands may be divided into the Frisian, an idiom which is gradually disappearing (it has a small literature — see FRISIANS); the Guelders dialect, or the so-called Lower Rhenish; the Groningen dialect, to which also belongs the Over-Yssel dialect, bearing a considerable resemblance to the German.

The common parent of the modern Dutch and Flemish was at one time supposed to be a development of the Old Frisian, but the general

view at the present day appears to be that the characteristic forms of the language of the Netherlands are at least as old as those of the Old Frisian, and that both languages are separate developments of a still older original. The Dutch language resembles the German in its vocabulary and syntax, but is considerably simpler in its accidence. Its vowel sounds are broader than those of the Germans, and its gutturals harsher. It possesses the same power of forming compound words from native materials as the German, and even to a greater extent, for while the German frequently borrows adjectives (for example) from foreign sources to correspond to nouns of native formation, the Dutch has for the most part such adjectives paronymous with the nouns. Thus the Germans may use the word Wissenschaftslehre for philosophy, but are obliged to adopt philosophisch for philosophical; while the Dutch have Wijsbegeerte and wijsgeerig, both of native origin.

The oldest literary monument of the language of the Netherlands is, as far as can be ascertained, an ordinance of the town of Brussels dated 1229, although it is possible that a few of the poems which have come down to us, particularly 'Reinaert de Vos' (Renard the Fox) may belong to the second half of the 12th century. In the latter part of the 13th century the language was brought to a pretty high point of literary cultivation by Jacob van Maerlant (born 1235), author of the 'Spiegel Historiæ,' but not long after his date the language began to decay, owing to the introduction of French forms, words, and idioms through the Burgundian domination (1363–1477). A few literary societies called Rederijkerskamern, appear to have striven against this result, but their efforts were not rewarded with any success until the struggle witn Spain at the close of the 16th century produced a reaction among the population of the Netherlands in favor of their native language, a reaction which, however, proved permanent only in the northern Protestant provinces, which eventually succeeded in throwing off the Spanish yoke, and which now form the kingdom of the Netherlands. The chief specimens of the language belonging to the period intervening between Maerlant and the reaction at the close of the 16th century are the civic laws of Antwerp (1300), a few chronicles such as that of J. Van Clere, and a translation of Boethius by Jacob Velt of Bruges (15th century).

The leaders in the restoration of the language of the Netherlands, or as we may now call it Dutch, to the dignity of a literary medium were Dirk Volkertszoon Coornhert and Filips van Marnix, both distinguished also as statesmen who took a leading part in all the political and theological conflicts of the day. Coornhert (1522–90) was a poet and dramatist as well as a prose-writer; but while in his poems and dramas he rises little above the Rederijker of his time — of a society of whom at Amsterdam he was a member — his numerous prose works are still looked upon as works of merit. Marnix (1538–98), although inferior to the former in purity of language, obtained even greater renown by his 'Bijenkorf der heil Roomsche Kerche' (1569, often since reprinted and translated into foreign languages). One of these two (it is uncertain which) is also the author of the national song 'Wilhelmus van Nassauwen.' The efforts of these men were entirely successful so that before the final conclusion of peace (1648) the golden age of the Dutch national literature, which fills up the greater part of the 17th century, had begun. Energy, independence, vivacity, and elevation of sentiment characterize the more important writers at the beginning of this period, among whom Hooft and Vondel hold the first place. Pieter Corneliszoon Hooft (1581-1647) brought the prose style to a high degree of excellence, and Joost van den Vondel (1587–1679), the greatest of Dutch dramatists, performed the same service for the language of poetry, and made it peculiarly fit for the expression of the sublime. Jacob Cats, familiarly known in Holland as 'Father Cats' (1577–1660), on the other hand, confined himself to the sphere of every-day life. His verses are marked by a careless ease, sometimes even slovenliness; but his language is pure, a circumstance of some importance, since after the termination of the war, when the mind of the people had become toned down from the high pitch to which it had been raised by their struggle for freedom and independence, he became the special favorite of his countrymen, and had thus a large share of influence in determining the character of the national language. Among the other leading names in pure literature belonging to this period are those of Constantyn Huygens (1596–1686), father of the celebrated mathematician, a satirist, epigrammatist, and didactic poet; Jacob van Westerbaan (died 1670) and Jan Van Hemskerk (died 1656), both erotic poets, the latter author of 'Minnedichten,' in imitation of Ovid, and also of a poetic romance entitled 'Bataavsche Arcadia'; Dirk Kamphuisen (died 1626), a celebrated hymn-writer. No department of literature received more attention than the drama during this period, and several authors who afterward distinguished themselves in other fields began their literary career as dramatists. Among these were Brandt (died 1685), who was also an historian and epigrammatist; Ondaan (died 1692), a political writer and lyrist; and Antonides van der Goes (died 1684) celebrated as a lyrist chiefly on account of his poem 'De Ijstroom' in which he sings the praises of Amsterdam. The principal writer of comedies was Bredero (1585–1618), whose language is that of the lowest of the people.

With the sinking of the national spirit which followed the conclusion of peace the national literature also began to decline, and its decline was hastened by its falling under French influence, to a great extent in consequence of the large influx of French Huguenots after the revocation of the Edict of Nantes (1685). In the crowd of feeble imitators of French originals which the 18th century produced in Holland, there are but few that can be singled out either as having kept themselves more or less free from that baneful influence, or as having shown unusual ability in what they performed under it. Among the former are the nature-poet Hubert Corneliszoon Poot (died 1733), the lyrist Jan van Broekhuisen (died 1707), and Pieter Langendijk (died 1756), a writer of comedies; among the latter Lucas Rotgans (died 1710), author of a number of dramas and a tedious epic entitled 'Willem III.,' Arnold Hoogvliet, Sijbrand Feitama, Nicolas Simon-

szoon van Winter (died 1795), and the brothers Van Haren.

During all this period, however, the language had maintained its purity almost uncorrupted, and again swept itself quite free from foreign taint when the literature took a more healthful development in the last quarter of the 18th century. The immediate cause of this change was the occupation of the Dutch with German literature, at that time energetically rising into prominence; and the change was assisted subsequently by their becoming acquainted with English literature, and by the internal commotions and the dangers from without, which quickened the national spirit. The change was first discernible in the lyric poetry. Jacob Bellamy (1757–86) and Rijnvis Feith (1753–1824) show most plainly in this branch of poetry the influence of the Germans, while Pieter Nieuwland (1764–94) formed himself more after the ancients. Willem Bilderijk (1756–1831), admirably gifted by nature, acquired by study and practice a wide knowledge of literature and a rare command of language, and shone in all departments of poetry, but was unable to breathe into his works any originality, owing to his rigorous adherence to the pedantic rules of Boileau, which prevented his rightly appreciating English and German literature. J. F. Helmers (1767–1813), a poet of more warmth than Bilderdijk, won great applause by the descriptive poem 'De Hollandsche Natie,' in which he glorifies his native country. The pleasing Hendrik Tollens (1780–1856) was as a lyrist the avowed favorite of his country, and his 'Overwintering der Hollanders op Nova-Zembla' is regarded as the best descriptive poem in the Dutch language. Among the others whose productions have met with more or less acceptance are Cornelis Loots, Adriaan Loosjes, Ad. Simons, the original and humorous A. C. W. Staring van den Wildenborch, Bilderdijk's disciple and eulogist Isaak Dacosta, by birth a Portuguese Jew, and J. J. L. ten Cate, an able translator of foreign poetry. An important service was rendered to the literature of his country by Jacob van Lennep (1802–68), who, incited by the example of Scott and Byron, introduced romanticism, and successfully repressed French classicism, by his masterly treatment of native tales and historical subjects in narrative poems. His chief followers are A. Bogaers, H. A. Meyer, B. ter Haar, and N. Beets. The dramatic productions of this period are comparatively insignificant. Prose, which since Brandt had sunk very low in Holland, was first raised again by Justus van Effen in his 'Hollandschen Spectator' (1731–5), an interesting periodical in imitation of the English 'Spectator.' About the beginning of the 19th century Van der Palm, De Borch, Siegenbeek, and others, acquired more or less distinction as historians; but the prose of Holland continued to be characterized by a somewhat strained rhetorical style till it was freed from its fetters by Geel and Van Lennep, the latter of whom wrote novels in language at once refined and popular. The novelists who rank next to Van Lennep are Oltmans (pseudonym Van den Hage), Mrs. Bosboom-Toussaint, Mulder, Hofdyk, Adele Opzoomer (pseudonym A. S. C. Wallis), Dekker, Daum (pseudonym Maurits), Van Rees, etc. Maarten Maartens writes his novels both in English and Dutch. Besides these novelists by profession the dramatist Schimmel has done good work in the department of the historical novel, and the poet N. Beets has published, under the title of 'Camera Obscura,' a series of sketches and tales illustrative of Dutch life overflowing with wit and humor. The list of recent Dutch prose writers also includes Weitzel, Lange, J. ten Brink, Gorter, Huet, Fruin (the Dutch Motley), Vosmaer, Vissering, Pierson, Keller, the youthful poet Perk (1860–81), Emants, Kloos, Netoscher, Verwey, Pol de Mont, Couperus, Schaepmann, Borel, Van Hulzen, Van Eeden, Helene Swarth-Lapidoth, Van Deyssel, De Koo, and Steijn Streuvels.

Dutch Science and Scholarship.— The Dutch on the whole can point to higher names in the various branches of scholarship and science than in that of pure literature, a circumstance which is no doubt partly due to the greater ease with which the results of such labors can become known and appreciated in translations than those of pure literature. Gansfort and Agricola in Groningen were among the first who distinguished themselves as divines and scholars. Erasmus of Rotterdam made far greater progress. A still greater genius, Hugo Grotius, in the beginning of the 17th century devoted himself simultaneously to philology and antiquities, poetry, history, philosophy, theology, and jurisprudence in all its branches. The northern provinces were long destitute of a university; that of Louvain, in Brabant, served for all the Low Countries. But the University of Leyden, founded in 1575 by Prince William I., soon exerted a beneficial influence over the whole united Netherlands. Men like Scaliger, Lipsius, Daniel and Nicolas Heinsius, Gronovius, Spanheim, Arminius, Drusius, Coccejus, and others, made this university famous over all Europe. Universities were also founded at Franeker in 1585, at Groningen in 1614, Utrecht in 1636, and Harderwijk in 1647, and their competition with the University of Leyden was very advantageous to science. Toward the end of the 17th century Huygens, Leeuwenhoek, Zwammerdam, and Hartsoeker distinguished themselves, in natural history and astronomy; Alb. Schultens, Tiberius Hemsterhuis, Lambert ten Kate, and Hermann Boerhaave in medicine; and a series of distinguished men flourished, particularly at Leyden. Utrecht had its Wesseling, Duker, Drakenborch, and Saxe. Among the jurisconsults Mathaeus, Huber, Noot, and Voet are distinguished. The cultivation of the Dutch language was especially promoted by Lambert ten Kate, Sewels, Zeydelaar, Kramer, and Van Moerbeek. In philology, history, geography, mathematics, natural philosophy, and medicine, the Dutch distinguished themselves in the highest degree, and their contributions to civil and public law are very valuable. They have always had men of the first distinction in ancient classical literature. From these notes it will appear that efforts have been made to adopt the language to elevated purposes, and that they have been crowned with success. The prose of the Dutch has little euphony and elegance, but it is well adapted to express practical truths in a simple and popular manner. It would undoubtedly have acquired greater perfection if their philosophical and other writers had not often made use of a foreign language. Erasmus, Lipsius,

Grotius, Wyttenbach, and others, wrote in Latin, and Francis Hemsterhuys in French. As with philosophy, so also with history. The sciences have flourished in the northern provinces, and kept pace with the progress of the times; but this is not the case in the southern provinces. The study of the law and of general jurisprudence is in a flourishing condition, and medicine has its notable exponents. The Dutch excel in mechanics and hydraulics. The orthography of the Dutch language was at one time very unsettled; but a uniform system has been adopted in the schools since 1804, though opposed vigorously by Bilderdijk and others. Consult: Schneider, 'Geschichte der Niederländischen Litteratur' (1887); and Ten Brink, 'Geschiedenis der Nederlandsche Letterkunde' (1896).

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Netherlands Schools of Painting, The, are comprised in the Dutch and the Flemish schools.

The Flemish school was founded by the brothers Hubert and Jan van Eyck, who established themselves at Bruges, and attracted scholars from far and near. They are believed to have flourished between 1370 and 1445. The Flemish school is distinguished by brilliant coloring; magical effect of the chiaroscuro; carefully labored, though often tasteless drawing; a strong yet natural expression, and boldness in composition. Among the scholars of the Van Eycks is Hans Memling, an artist whose works are among the best of the early Flemish school. Among later masters of the same school are Quintin Matsys or Messys of Antwerp (died 1529), Luke of Leyden (died 1533), and wholly in the 16th century Francis Floris (born 1520; died 1570), called, on account of the great influence he exercised on contemporary painting, the Flemish Raphael. Among his scholars were the two Francks, the two Pourbuses, and Mart. de Vos (born 1520). Other painters rather later in time are Spranger (born 1546); Henry Steenwyk, the painter of perspective (born 1550); Denis Calvert; the brothers Paul and Matthew Bril; Van Ort (born 1557); and the two Pieter Breughels, father and son; Roland Savery of Courtray (born in 1576). After all these came Peter Paul Rubens (1577–1646), the boldest painter of modern times; a man of inexhaustible industry, of gigantic imagination and power of representation, to whom about 4,000 paintings are ascribed. With him the Flemish school reached its acme. Several distinguished painters follow: Frans Snyders (born 1579), whose hunting and animal pieces excel all others in boldness and truth; Josse de Momper (born 1580), a landscape-painter esteemed for his valleys and the distant views which they present; Pieter Neefs, the famous church painter; David Teniers, father and son, noted for their representations of peasants, guard-rooms, tap-houses, and all kinds of low life; Gaspar de Crayer (born 1582), who approaches in the expression and coloring of his historical paintings to Rubens; Gerard Seghers, distinguished as a historical painter; his brother Daniel, famous for flower and insect pieces. Jakob Jordaens (born 1594), however, excelled all those who make Rubens their model. Abraham Janssen and his pupil Theodoor Rombouts equal Rubens in coloring, but not in conception. The industrious Luke van Uden executed the landscapes for Rubens' paintings, and his views of the sky at dawn are worthy the study of every artist. Anthony Vandyck (born 1599) obtained the name of the "king of portrait painters." He excelled Rubens in correctness and beauty of forms. Cornelius Schut, for whom Jan Wildens often painted the landscapes, distinguished himself as a historical painter; Adriaan Brouwer acquired fame by his excellent representations of scenes from common life; Jan van der Meer by his pastoral pieces; Anton Francis van der Meulen by his battle pieces; Frans and Jan Milet, father and son, by their landscapes. Besides these there are the names of Jan Bol, Wenceslaus Koeberger, Hendrik Goltzius, Hendrik van Balen, Frans Hals, Willem van den Nieuwelandt, Abraham Diepenbeck, Theod. van Thulden, Gerard Lairesse, Jan Frans van Bloemann, Jan van Cleef, Pieter Eykens, Robert van Oudenarde, Jan Anton van der Leepe, Jan van Breda, etc.

The Dutch school is distinguished for a faithful copying of nature, great finish, good chiaroscuro, skilful disposition of colors, and delicate penciling; but it is reproached with choosing often ignoble subjects and with incorrectness of drawing. Its founder is Luke of Leyden (born 1494). Its most prominent artists are Otho van Veen, of Leyden (born 1586; died 1634), who deserves mention also as the teacher of Rubens. Abraham Bloemart of Gorkum (died 1647) painted historical subjects, landscapes, and animals in good taste. Cornelis Poellenburg of Utrecht (born 1586; died 1663) was peculiarly happy in painting small landscapes with figures. Worthy pupils of his are Daniel Vertange and Jan van Haensberge. Johan Wynants of Haarlem (born 1600) is distinguished as a landscape-painter; and Jan Daniel de Heem, of Utrecht (born 1604; died 1674) for his faithful imitation of flowers, fruits, carpets, vases, etc. The highest place belongs to Rembrandt (1606–69), whose masterly coloring atones for all his defects. In the delineation of common life the following are distinguished: Gerard Terburg of Zwoll (born 1608; died 1681); Pieter van Laar (1613–73), the two Ostades, and Jan Steen (1636–89); in landscapes, Jan Both of Utrecht (born 1610; died 1650); Hermann Swaneveld of Woerden (born 1620; died 1690). Asselyn (born 1610; died 1680) painted battles, landscapes, and pastoral pieces with a brilliant coloring and a delicate pencil. Scarcely any painter drew more correctly, colored more beautifully, and distributed light more truly than Gerhard Dow or Douw (born 1613; died 1680). John Fyt (born at Antwerp, 1625) was a good painter of beasts, birds, and fruits; Gabriel Metzu, who worked in the style of Terburg, excelled him in softness of penciling. The landscapes of Benenberg of Utrecht are full of life and freshness. Philip Wouvermans (born 1620; died 1668), the most famous painter of horses, produced battle and hunting pieces, horse-markets, travelers, and robbers; and his paintings of all kinds are highly esteemed. The landscapes of Anton Waterloo, for which Weenix executed the figures, are sometimes cold, but please on account of the accuracy with which he represents light playing through foli-

age and the reflection of objects in water. Berghem acquired the name of the Theocritus of painters; and perhaps Paul Potter is the only one who can dispute the superiority in representing cattle with him. While Ludolf Backhuysen painted storms at sea with an effect as true as it is terrible, Frans Mieris distinguished himself by fine and accurate representations of many domestic subjects, and Jan Pieter Slingeland was hardly less accurate. Godfrey Schalken of Dort excelled in the illumination of night scenes. Excellent market scenes, animals, and landscapes were painted by Karel du Jardin. Albert Cuyp and Adriaan van de Velde painted landscapes and animals with almost unequaled perfection. Hobbema is another excellent landscape-painter. For the representations of the beautiful solitudes of nature Jakob Ruysdael is celebrated, and for quiet lovely moonlight scenes Van der Neer. No painter has painted more delicately and with more finish, even in insignificant trifles, than Adriaan van der Werf. The flower-painters, Pieter van Hulst of Dort, and Jakob van Huysum, are almost unrivaled in this department. Other names are Cornelis Ketel, Bartholomew van der Helst, Albert van Everdingen, Gerbrandt van den Hendrik Verschuuring, Maria van Oosterwyk, Willem Kalf, Melchior Hondekoeter, Cornelis de Bruyn, the two Houbraken, Rachel Ruisch, Cornelis du Sart, Jan de Witt, Cornelis Troost, Van Os, Van Spaendonck, Scheffer, Ommeganck, etc. About the beginning of the 19th century the classicism of France had a great influence on the Dutch historical school, as seen in the works of Kruseman, Pieneman, Navez, and Van Bree. In genre painting the old models were still followed, and good work was done by Jan Kobell and Eugene Verboeckhoven; Scheefhout and Schotel deserve mention as landscape and marine painters. A more natural and correct style followed the fall of the school of David in France, and Louis Gallait, Edouard de Biefve, Gustaf Wappers, Nicaise de Keyzer, and Hendrik Leys distinguished themselves as historical painters. Florent Willems and Alfred Stevens were genre painters. A. de Kuyff and Xavier de Cock painted excellent landscapes. Among Dutch painters of the present day we should specially mention Alma Tadema and Josef Israels. The former long resident in England, a baronet and member of the Royal Academy, is remarkable for the skill with which he treats subjects selected from states of civilization that have passed away, as from ancient Egypt, Rome, or the Franklin monarchy. The genre pictures of Israels and of Bisschop are also well known. The artists of the Netherlands are still distinguished by the peculiarities of the two schools, the Dutch and the Flemish. The reproach of an almost exclusive adherence to common reality has been often made to the whole school of the Netherlands, but is confined by some to the Dutch; while the Flemish school, they say, in its more elevated productions has striven to represent a nobler nature. The chief question in painting, however, is not what the artist attempts, but what he accomplishes; and if critics are right in saying that in the works of the Flemish painters we generally miss the spirit of the poet in the beauty of the manual execution, then the Dutch school would deserve the preference, because, though it takes most of its subjects from common reality, it often represents them with a poetic conception of their character. It would be better, however, to describe them both as deficient in ideal beauty, but as distinguished in the highest degree for faithful imitation of nature.

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Nethersole, nĕth'ĕr-sōl, **Olga,** Anglo-American actress: b. Kensington, England, 18 Jan. 1870. She made her début in 'Harvest' at the Theatre Royal, Brighton, in 1887 and the year following was engaged at the Royal Adelphi theatre in London. She was later engaged at the Garrick in London and then made a tour of Australia. Her next appearance in London was at the head of her own company playing 'The Transgressor.' She has made several trips to the United States where she has been well received. Her leading roles are: Camille; Juliet; Carmen; etc. See Strang, 'Famous Actresses of the Day in America' (1899).

Neth'inim, in Biblical history, the lowest order of ministers of the temple at Jerusalem. They were hereditary attendants on the Levites in the services of the Temple and were to do the more menial part of the work. It is supposed that the Gibeonites originally held a similar office (Josh. ix. 21–27.) At the return from Babylon, 392 of these ministers accompanied Zerubbabel (Ezra ii. 58, Neh. vii. 60), and 220 came with Ezra (Ezra viii. 17, 20); 612 of them in all.

Néthou, nā-too', **Pic de,** Spain, the highest point (11,169 feet) of the Pyrenees (q.v.).

Net'ley, Abbey, and **Netley Hospital,** England. See SOUTHAMPTON.

Netscher, nĕts'hĕr, **Caspar,** Dutch painter: b. Heidelberg 1639; d. The Hague 15 Jan. 1684. He was taken to Holland in early childhood and as the adopted son of a physician early began the study of medicine, but eventually learned painting from Koster, a still-life painter of Utrecht, and from Terborch (q.v.) at Deventer; he also spent a short time during his student years at Bordeaux, France, but eventually settled permanently at The Hague. He was a genre painter who imitated the manner of Terborch, and chose his subjects from aristocratic life. He sometimes, however, painted kitchen interiors, and sheep, also portraits. His weakest work consists of small, delicately handled and enamel-like pictures of historical and mythological subjects, which are blemished by mannerisms. Almost every public gallery in Europe contains examples of his numerous works, but the Dresden gallery is particularly rich in his cabinet pieces, such as, his 'Lady at the Harpsichord'; 'The Doctor's Visit'; 'The Harp Player.'

Nettement, nĕt-mäṅ, **Alfred François,** French journalist: b. Paris, France, 22 July 1805; d. there 15 Nov. 1869. He was educated at the Collège Rollin in Paris and entered journalism. He founded 'L'Opinion Publique' and for his staunch support of the grandson of Charles X. he was imprisoned by Louis Philippe after his accession. He wrote: 'History of the Revolution of July, 1830' (1833); 'History of French Literature under the Reign of

Louis Philippe' (1854); 'Histoire de la Restauration' (8 vols. 1860-72); etc.

Net'ter, Thomas, also called **Waldensis,** English Roman Catholic clergyman: b. Saffron Walden, England, about 1377; d. Rouen, France, 2 Nov. 1430. He entered the Carmelite order and graduated from Oxford, receiving ordination in 1394. He became provincial prior of the Carmelites in 1414 and strongly opposed the Lollard reform movement. He was confessor to Henry V. and Henry VI. and died while on a mission to Poland for the latter. He wrote: 'Doctrinale Fidei Ecclesiæ Catholicæ contra Wiclevistas et Hussitas' and the 'Fasciculi Zizanorium Magistri Johannis Wyclif.'

Nettle, a plant of the natural order *Urticaceæ,* having unisexual flowers, the male and female on the same or separate plants: the male flowers with a 4-parted perianth and four stamens; the female flowers with a 2-parted perianth and a tufted stigma, fertilized by the wind; the fruit an achenium. The species are herbaceous plants, shrubs, or even trees, many of them covered with stinging hairs, which pierce the skin when touched, and emit an acrid juice, often causing much inflammation and pain. These hairs are stiff and terminate in a silicious point which penetrates an animal's skin, breaks off and sets free a poison, the nature of which is not understood. When a nettle is grasped in such a way as to press the hairs to the stem no stinging ensues; but the slightest inadvertent touch of some of the species produces very severe pain. The stinging of the native nettles of Europe is trifling in comparison with that of some East Indian species. *Urtica crenulata* is particularly notable for the severity of the pain which it produces, without either pustules or apparent inflammation. The first sensation is merely a slight tingling, but within an hour violent pain is felt, as if a red-hot iron were continually applied, and the pain extends far from the original spot, continues for about 24 hours and then abates, but is ready to return in its original intensity on the application of cold water, and does not cease for fully eight days. Cold water has a similar effect in increasing or renewing the pain of all kinds of nettles. Still more formidable than this species is *U. urentissima,* the devil's leaf of Timor. The two most familiar species throughout America and Europe in waste places are the small virulent *U. urens,* and the least venomous is the most common and only perennial species, the great nettle (*U. dioica*), everywhere abundant, but particularly near human habitations, or their former sites, the desolation of which it may be said to proclaim. The roots of nettles, boiled with alum, afford a yellow dye; and the juice of the stalks and leaves has been used to dye woolen stuffs of a beautiful and permanent green. The young shoots of *U. dioica* have been much used in some parts of Scotland and other countries as greens, and their peculiar flavor is much relished by some, although, in general, the use of them is confined to the poor. They are valuable as antiscorbutics, but are gritty to the taste from the quantity of crystals (cystolithes) contained. Whatever it is that gives nettles their stinging power is dissipated by boiling and drying. The high value of nettles as food for swine is well known to the peasantry of many countries; the great nettle is cultivated in Sweden for fodder of domestic animals; and nettles are also highly esteemed as food for turkeys. The seeds are extremely nutritious to poultry, and are given to horses by jockeys, in order to make them lively when they are to be offered for sale. The stalks and leaves are employed in some parts of England for the manufacture of a light kind of beer, called nettle beer. The bast-fibre of nettles is useful for textile purposes. Yarn and cloth, both of the coarsest and finest descriptions, can be made of it. The fibre of *U. dioica* was used by the ancient Egyptians, and is still used in various countries. When wanted for fibre the plant is cut in the middle of summer, and treated like hemp. Nettle-cloth, or grass-cloth, is a beautiful fabric made from rhea fibre. The fibre of *U. cannabina,* a native of the south of Siberia, Central Asia, is much used; and from that of *U. whitlavi* both fine lace and strong ropes can be manufactured. The fibre of *U. japonica* is much used in Japan, that of *U. argentea* in the South Sea Islands; that of *U. canadensis* in Canada; and that of *U. heterophylla,* a widely-diffused Indian species, is of very glossy silky appearance, and is manufactured into cloth in Assam. (See FIBRE.) The seeds and herbage of *U. membranacea* are used in Egypt as emmenagogue and aphrodisiac; and somewhat similar properties are ascribed to *U. dioica. U. tuberosa* produces tubers, which are nutritious, and are eaten in India raw, boiled, or roasted. Australia produces a magnificent tree-nettle, *U. gigas,* abundant in some parts of New South Wales, ordinarily from 25 to 50 feet high, but sometimes 120 or 140 feet, with trunk of great thickness, and very large green leaves, which when young sting violently.

Many plants are so-called, as the "dead nettles," labiates of the genus *Lamium;* the "horse nettle" (*Solanum carolinense*); and others.

Nettle-butterfly, a European butterfly (*Vanessa urticæ*), which feeds and lays its eggs on nettles; other butterflies, including American species, have the same habit.

Nettle Rash. See URTICARIA.

Nettle-tree, a tree of the genus *Celtis,* especially in the United States the hackberry (q.v.); and in Europe *C. australis,* commonly planted as a shade-tree in France and Italy.

Nettleship, net'l-shĭp, **John Trivett,** English painter and writer: b. Kettering, England, 11 Feb. 1841; d. London 31 Aug. 1902. He studied art under Poynter in the Slade School, London, and made a specialty of wild animals. His many striking and imaginative canvases include: 'Puma Devouring a Peacock'; 'A Death Grip'; 'A Mighty Hunter'; 'A Big Drink'; 'The Blood Trail.' Among his writings are: 'Essays and Thoughts,' a contribution to Browning Literature (1890), and 'George Moreland' (1898).

Nettleton, nĕt'l-tŏn, **Alvred Bayard,** American soldier and journalist: b. Berlin, Ohio, 14 Nov. 1838. He was educated at Oberlin College and entered the Union Army at the outbreak of the Civil War, rising from the ranks to be brevet brigadier-general. He studied law after the war and engaged in a journalistic career, and in 1890–3 he was assistant United States treasurer. He wrote: 'Trusts or Competition' (1900).

Neu Brandenburg, noi-brän'dĕn-boorg, Germany, a town of the grand-duchy of Mecklenburg-Strelitz, 20 miles northeast of Neu Strelitz near Lake Tollense. It was founded in 1248, and retains its picturesque mediæval ramparts and gateways. Its chief edifices are the Belvedere palace, and a 13th century Gothic church. It has manufactures of pianos, machines, paper, etc. Pop. (1900) 10,560.

Neu-Lauenburg, noi low'ĕn-boorg, formerly DUKE OF YORK ISLAND, an island of the Bismarck Archipelago (q.v.) off the west coast of New Mecklenburg.

Neu Pommern, noi pŏm'ĕrn. See NEW POMERANIA.

Neuchâtel, nė-shä-tĕl, or **Neufchâtel,** Switzerland, the name of a canton, town, and lake. (1) The canton in the west of the country, bounded by the cantons of Bern and Vaud, the lake of Neuchâtel, and France, has an area of 312 square miles. It lies in the midst of the Jura Mountains, four chains of which, running from northeast to southwest, traverse the canton, and are separated by elevated, longitudinal valleys. The greater number of the numerous streams which water the canton flow into the Rhine; several are feeders of the Lake of Neuchâtel mentioned below. Chief of the minerals is the asphalte of Val de Travers. Grazing is extensively attended to; wine, absinthe, fruits, hemp, and flax are produced. The manufactures are important; the principal are lace, cotton, clocks, and watches; a considerable industry is also carried on in cutlery, mathematical and philosophical instruments, chintz, and other cotton stuffs. The famous Neuchâtel cream-cheeses, however, are made, not in this canton as popularly supposed, but in France, at Neuchâtel-en-Bray, a small Norman town, 25 miles southeast of Dieppe by rail. Neuchâtel was an independent principality as early as 1034. After various changes of masters it came into the hands of the old French family of Longueville (1504), which became extinct in 1707. The king of Prussia, as heir of the house of Orange, was then called to the sovereignty by the states of Neuchâtel, and his title was confirmed by the Treaty of Utrecht. In 1806 Prussia ceded it to France, and the emperor conferred it on Marshal Berthier, afterward Prince of Neuchâtel-Wagram. By the Peace of Paris it was restored, with additions, to Prussia. In 1814 the principality was received into the Swiss Confederacy, and it was the only canton with a monarchical government, which it preserved till 1848. The religion is Protestant (Reformed). The language is French; but German is also spoken. Neuchâtel furnishes 960 men to the army of the Swiss Confederacy. Pop. (1900) 126,279.

(2) The capital, Neuchâtel, is 24 miles west of Bern, on a steep slope above the northwest shore of Lake Neuchâtel. It has an old Gothic church of the 12th century; many charitable institutions; a gymnasium or college, containing a valuable natural history collection founded by Professor Agassiz, a native of the town, etc. It has various manufactures and an extensive trade. Pop. (1901) 20,843.

(3) The Lake of Neuchâtel (Neuenburgersee), 1,420 feet above sea-level, is 25 miles long, from three to six miles wide, with a maximum depth of 472 feet. The Thiele serves as its outlet, and carries its waters into the neighboring Lake of Bienne, and thence into the River Aar which communicates with the Rhine. The lake is plentifully supplied with fish; steamers ply on its waters between Neuchâtel, Morat, Yverdun, Estavayer, etc.

Neuendorff, noi'ĕn-dŏrf, **Adolph Heinrich Anton Magnus,** American musician: b. Hamburg, Germany, 13 June 1843; d. New York 4 Dec. 1897. He came to the United States when 12, was educated in the public schools and pursued a course in music. At 15 he made his début as a pianist, and the next year he led a chorus and played in an orchestra. In 1864 he was musical director of the German Theatre, Milwaukee, Wis., and in 1865 he conducted the German grand opera in New York. He founded the Germania Theatre in 1872 and managed it for 11 years; he assumed the leadership of the Philharmonic Society of New York in 1878, and later became director of the Metropolitan Orchestra. Among his compositions are: 'The Rat Charmer of Hamelin' (1880); 'Don Quixote' (1882); 'Prince Waldmeister' (1888), etc.

Neufeld, noi'fĕlt, **Charles,** Anglo-German contractor: b. Dannerau, East Prussia, 1856. He was educated at the universities of Königsberg and Leipsic, was a trader in Upper Egypt and then entered the English army of occupation at Alexandria as interpreter; later becoming constructor to the Royal Engineer department. He served in the Nile campaign 1884–5, and while fortifying Assouan in 1887 was captured by the Dervishes, taken to Khartum and sentenced to death, but was saved from this fate by Kitchener's capture of Khartum. He has published 'A Prisoner of the Khaleefa' (1899); 'Under the Rebel's Reign' (1900).

Neuhof, noi'hŏf, **Theodor von,** BARON, German adventurer, King Theodore I. of Corsica: b. Metz 1686; d. London 11 Dec. 1756. His father was a Westphalian noble in the French service; the son became page to the Duchess of Orleans; fought in the French and in the Swedish armies; was employed by Count Goertz and then by Alberoni on diplomatic errands; married Lady Sarsfield, whom he deserted, having stolen her diamonds; lost all his property in Law's schemes; went to Florence in 1732; and there intrigued with some Corsican revolutionists, at whose invitation he landed in Corsica in 1736, with arms and equipment furnished by the Bey of Tunis, and was proclaimed king. He was at first successful against the Genoese, who, however, were reinforced by the French during Neuhof's absence in Holland; and he was defeated upon his return in 1738. After the withdrawal of the French in 1741, he made several attempts in 1743 to recover his kingdom and in 1749 retired to England, where he was jailed for debt, and was released in 1756, thanks to a subscription raised by Horace Walpole. His son, Colonel Frederick Neuhof, an English officer, wrote 'Mémoires pour Servir à l'Histoire de Corse' (1768). Consult Fitzgerald, 'King Theodore of Corsica' (1890).

Neuilly, nė-yē, or **Neuilly-sur-Seine,** sür sān, France, a town in the department of Seine, suburban to Paris, immediately north of the Bois de Boulogne. The fine 18th century level bridge by Perronet, across the river here, is an attractive feature, and the town is noted for

its benevolent institutions, parks, and a handsome residential section built chiefly on the site of the historic royal castle and park of Neuilly, destroyed during the revolution of 1848. Neuilly also has factories of several Paris establishments for the production of domestic commodities. Pop. (1901) 36,437.

Neumann, noi'män, **Franz Ernst,** German physicist and mineralogist: b. Joachimsthal 11 Sept. 1798; d. Königsberg 23 May 1895. He studied at Berlin, and became professor at Königsberg in 1828. His work in physics was of the greatest importance and he is reckoned the father of mathematical physics in Germany, and the founder of the modern theory of mineralogy by reason of his studies of the optical relations of crystals. He published a law of electrodynamics different from that of Ampère and from Grassmann's; determined the diffusivity of soils and of metals; and studied reflection and refraction of light, induction currents, specific heat, etc. He contributed to various scientific journals. Many of his lecture courses were edited and published by his pupils; among these are 'The Theory of Magnetism' (1881), 'Introduction to Theoretical Physics' (1883), 'Theoretical Optics' (1885), 'Theory of the Potential' (1887), and 'Capillary Attraction' (1894). Consult the biography by Volkmann (1896).

Neumann, John Nepomucene, Roman Catholic bishop of Philadelphia: b. Prachatitz, Bohemia, 28 March 1811; d. Philadelphia 5 June 1860. He was educated at Budweis and Prague; took orders; came to America as a missionary in 1836; engaged in work near Niagara for four years; in 1840 entered the Redemptorist Order; and became assistant pastor of St. James' Church, Baltimore, in 1842. He was again busied in mission work in Pennsylvania, Maryland and Virginia; was appointed superior of the Redemptorist Convent in Pittsburg, where he built the church of St. Philomena; returned to Baltimore in 1847 as provincial of the Redemptorists in America; established the Sisters of Notre Dame in this country; and in 1851 became bishop of Philadelphia. He went to Rome in 1854 and assisted in the definition of the dogma of the Immaculate Conception. Bishop Neumann was a man of culture and of administrative ability. Consult the 'Life' by Berger (translated into English by Grimm, 1884).

Neumann, Karl Friedrich, German Orientalist: b. Reichmansdorf, Bavaria, 22 Dec. 1798; d. Berlin 17 March 1870. He was educated at Heidelburg, Munich, and Göttingen, and after travels in India and China (1829–30) from which he returned with a great number of Hindu and Chinese books, was professor of Oriental languages at Munich 1831–52. He was a Liberal in politics, a circumstance which finally cost him the loss of his professorship. Among his many works are 'Mémoires sur la Vie et les Ouvrages de David Philosophe Arménien' (1829); 'Asiatische Studien' (1837); 'Geschichte der Vereinigten Staaten von Nordamerika' (1863-6); 'Hoen Schein, or the Discovery of America by Buddist Monks' (1874).

Neumann, Karl Gottfried, German mathematician, son of F. E. Neumann (q.v.): b. Königsberg 7 May 1832; he studied at Königsberg, became instructor of mathematics at Halle in 1858, was made professor at Basel in 1863 and at Tübingen in 1865, and since 1868 has been professor at Leipsic. His publications and special studies have been in the field of mathematical physics (following his father) and in higher analysis. Among his books mention should be made of 'The Mechanical Theory of Heat' (1875), 'Hydrodynamic Studies' (1881), 'Some Points in Mathematical Physics' (1893), 'Newton's Law of Attraction' (1896).

Neumayer, noi'mī-ėr, **Georg,** German meteorologist and hydrographer: b. Kirchheimbolanden, Bavaria, 21 June 1826. He was educated at the University of Munich and went to Australia under the auspices of Maximilian II. and there founded the Flagstaff Observatory at Melbourne, where he made valuable magnetic observations. He returned to Germany in 1864 and promoted the German-African Company and organized several expeditions to the North and South Polar regions. He was long connected with the hydrographic bureau at Berlin and in 1876 became director of the Marine Observatory at Hamburg. He wrote: 'Die Beobachtungsergebnisse der deutschen Stationen im Systeme der internationalen Polarforschung' (with Börgen, 1886); 'Atlas des Erdmagnetismus' (1891); 'Anemometer-Studien' (1897); and 'Auf zum Südpol!' (1901).

Neumayr, noi'mīr, **Melchior,** Austrian geologist: b. Munich 24 Oct. 1845; d. Vienna 29 Jan. 1890. He was educated in his native city and at Heidelberg, becoming docent at the latter university in 1872 and full professor of geology there in 1880. He traveled extensively in the Carpathian Mountains, the Alps, Italy, Dalmatia and elsewhere in southern Europe, studying the Jurassic formations. He published 'Die Stämme des Tierreichs: Wirbellose Tiere' (1890); 'Erdgeschichte' (1885–7); etc.

Neumes, nūmz, in music, (1) signs or characters in early music indicating tones or phrases. A large number of these characters were used, being more or less complicated in form and meaning. This was the first step toward a graphic musical notation. (2) Melodic phrases sung to a single syllable, more particularly at the end of a sentence or clause. (3) Modulation of the voice in singing. See MUSIC; MUSICAL NOTATION.

Neumünster, noi'mün-stĕr, Germany, a town in the Prussian province of Schleswig-Holstein, on the Schwale, 17 miles by rail southwest of Kiel. It is a well-built, busy manufacturing centre, producing principally woolens, and also leather, paper, ironware, soap, etc. Pop. (1900) 27,335.

Neuquen, nā-oo-kān', Argentina, a territory in the western part of the republic, bounded on the west by Chile. Its area is 42,345 square miles. The main range of the Andes Mountains crosses the western part from north to south, and numerous short ranges extend throughout the territory. The Rio Negro and its largest tributaries have their rise in Neuquen, and the Rio Colorado is on its northern boundary. The principal occupations are mining silver and cattle-raising. The population is mostly Indians, but since 1884 a number of Chileans have settled in the territory. The

capital is Chosnalal in the northern part. Pop. (1895) 14,517; (1900) 16,095.

Neural'gia (Greek *νεῦρον*, nerve + *ἄλγος*, pain), severe paroxysmal pain, either along the course of one or more sensory nerves, or at the place of their distribution. In neuralgia proper no definite lesions are discoverable. Sometimes there is reason to believe that inflammation of the sheath of the nerve is the starting-point. Not infrequently there are well-defined points of tenderness (ascertained by palpation) over the affected nerve, especially where it emerges upon the skin from a bony groove or opening. Sometimes with the pain there is a twitching of adjacent muscles. Radiation of pain, neuralgic in character, to nerve-branches other than those affected is quite common. Dental caries, for example, may produce supra-orbital neuralgia, and uterine disease, occipital neuralgia. Neuralgic pains are described by the sufferers as cutting, burning, boring, lightning-like, crushing, etc. After a neuralgic attack the part affected has a feeling of discomfort and bruising. There is frequently also a sense of exhaustion, with a desire to sleep. If there are repeated attacks of neuralgia, pallor of the skin, followed by intense redness, by hyperæsthesia, or by loss of tactile sensibility in the part affected, horripilation and other evidences of vasomotor disturbances are not uncommon. The disease may attack any part of the body, but is most common in the face. When involving the facial branches of the fifth pair of nerves (the trifacial nerves) it is popularly called tic-douloureux. There are severe flashes of pain over the eyebrows, in the eyes, nose, lips, chin, teeth, etc.

Neuralgias affecting various parts of the body are named in accordance with the part affected. Sciatica, for example, is neuralgia of the sciatic nerve, the pain extending down the back portion of the thigh and into the calf of the leg. Enteralgia is neuralgia of the bowels; gastralgia, of the stomach, angina pectoris, of the heart; intercostal neuralgia, of the intercostal muscles; and myalgia of the muscles in general. The presence of neuralgia, especially with repeated attacks, usually indicates a weak state of the general system, which may follow long-continued fevers. The disease may occur during the progress of various acute affections. The causes of neuralgia are various: poor blood and malnutrition, pressure of a tumor upon a sensory nerve, irritation of the nerve from the swelling of an adjacent part, exposure to cold and wet, fatigue, mental emotion, the abuse of tea, coffee, and alcohol, etc. The treatment varies with the nature of the different cases. Hot applications and anodyne liniments are often of value. As the pain is severe, persons affected are too often tempted to resort to narcotics for relief. Such drugs should not be used without the advice of a physician.

Neurastheni'a (from Greek *νεῦρον*, nerve + *ἀσθένεια*, weakness), a condition of nervous debility or exhaustion; popularly called nervous weakness, nervous prostration, etc. The term is now generally applied to a disordered condition of the nervous system manifested by various symptoms. It was originally used in 1879 by Dr. George M. Beard. Nervousness, so called, is manifested chiefly by undue sensitiveness to external impressions. It frequently precedes or progresses into nervous prostration. The distinction between hysteria (q.v.) and neurasthenia is not always plain, for the two affections frequently merge into one another. Neurasthenia is not a disease; it is a neurosis, a functional derangement, usually lasting a considerable time, but generally recovered from under proper hygienic and medicinal treatment. No morbid anatomical changes are at present known. The disorder is caused sometimes by various functional and organic affections of the body, but in these instances there is probably a pre-existing basis of functional perverted action of the nervous system. Neurasthenia so produced is known as symptomatic. When certain symptoms predominate, distinctive terms are sometimes used; for example, in acoustic neurasthenia, symptoms of deafness; in gastric neurasthenia, weak digestive action, gastric pain (nervous dyspepsia); in cardiac neurasthenia, palpitations, irregular action of the heart, præcordial pain, etc., symptoms simulating heart-disease; and in cerebral neurasthenia, despondency, irritability, moodiness, sleeplessness, restlessness, and confusion of mind, especially in relation to figures.

Neurasthenia is about as common among men as among women, and occurs usually between the ages of 20 and 50, when worry and work are maximal. Signs of a neurasthenic tendency are sometimes seen in young people (of a neuropathic or neurotic diathesis); namely, oversensitiveness, precocity, insomnia, chorea, somnambulism, and night-terrors. In girls especially there are also headache, backache, anæmia, and lassitude. Sometimes neurasthenia marks the beginning of mental disease, such as melancholia. The causes of neurasthenia may be classified as predisposing (such as heredity and a neurasthenic tendency), and exciting or acquired. Mental irritability and the loss of self-control in parents are causes. So also gout, syphilis, rheumatism, and chronic alcoholism are conditions that transmit neurasthenic tendencies. Improper mental and physical training of children, and too much coddling are often responsible for the affection. Among the exciting causes are: injuries; severe mental and physical work for a length of time beyond the individual's power of endurance; worry, especially if associated with lack of rest, of pure air and of suitable food; and the excessive concentration of the thoughts upon one's self. So common has neurasthenia become in the strenuous, competitive life of America, especially in cities, that it is sometimes spoken of as "the American disease." Most individuals naturally have more nervous force and energy than is required for the ordinary necessities of life; while neurasthenia appears most frequently among those not in robust health and who are particularly susceptible to nervous impressions, quick, versatile, sensitive, and perhaps talented persons. Still persons of strong physical and mental powers, by reason of dissipation, overexercise, overeating and drinking, late hours, etc., may unduly tax their reserve supply of nervous energy, and sooner or later exhaust the nervous system and bring on mental and physical bankruptcy. The habit of high-pitched and rapid conversation and the use of exaggerated language, the ready willingness to call oneself

"nervous," the very common and unjustifiable use of the terms nervousness and nervous prostration, all tend indirectly to debilitate the nervous system and pervert its action. The use of the term "nervous" as an excuse for failure to do one's duty is too common. So used, it means weak-mindedness, the loss of self-control. "Nerveless" is a better term which has been suggested for such cases.

The symptoms of neurasthenia are many and various. The individual may appear to be in perfect health, but frequently has a worried look. There may be irritability of temper, fatigue without adequate reason, poor sleep, with exhaustion on waking, headache, with sense of weight or constriction, impaired memory, want of appetite, constipation, various forms of muscular weakness, muscular tremors and contractions, an uncertain gait, a feeling of weariness, giddiness, pain along the spine (spinal irritation) and in the joints, hyperæsthesia, or paræsthesia (numbness and tickling), sexual emissions, and defects of sight and hearing. There is no capacity for sustained work. The recognition of mental and physical weakness causes the individual affected to become self-conscious, to distrust others, to have a feeling of isolation, to prefer solitude, to exaggerate trifling impressions, to dread the dark, and to suspect contamination from food, touch, etc.

Treatment of this obscure nervous disorder requires considerable time and the care of a kind but firm physician and nurse, who have the confidence of the patient. The co-operation of the patient should be elicited in the plans for recovery. If possible, the change from familiar scenes and surroundings, from the tumult and cares of city life to the country, to life in the open, in the woods, by the seashore or in the mountains, should be effected. Complete rest (see REST CURE), physical and mental, is the leading factor in the treatment. Travel, massage, electricity, induced sleep, carefully selected food, the removal of exciting causes, such as gout, lithæmia, and uterine disease, are all remedial and curative measures of importance in this affection.

Neureuther, Eugen Napoleon, German artist: b. Munich 13 Jan. 1806; d. there 23 March 1882. He began his studies at the Munich Academy, continued them at Paris (1830) and going subsequently to Rome (1838) fell under the influence of Cornelius (q.v.). In 1848 he was put at the head of the design department in the Royal Porcelain Manufactory at Nymphenburg, a position which he held until the sale of that establishment in 1856. He was engaged from 1868–77 as professor of design in the Royal Institution of Industrial Art. His brilliant versatility is shown in his skill as a house decorator, etcher, painter and industrial designer. He designed the border illustrations for Goethe's 'Ballads and Romances' (1829–40); he published 'Souvenir du 27, 28, 29 July 1830–1831); and 'Bavarian Shepherd's Song with Illustrations' (1834). In 1835 he painted scenes from Wieland's 'Oberon' for the royal palace at Munich. For the *édition de luxe* of Herder's 'Cid' he produced 70 illustrations. His etchings after Mottmann's frescoes are admirable, and among his oil paintings are to be found in the Schack Gallery at Munich: 'Portia's Dream'; 'The Dying Nun'; 'The Villa Mills'; 'The Villa Malta'; and a scene from 'Hermann und Dorothea.' He also furnished designs for the School of Industrial Art, and decorated the ceiling of the staircase and the cupola of the Polytechnique at Munich with graffito painting.

Neu'ridine, a ptomaine having the chemical formula $C_5H_{14}N_2$, which is formed during the putrefactive decomposition of flesh, appearing usually on the second day, and disappearing again on the fourth day. It also occurs in the fresh human brain, whence the name (Greek, "nerve"). Neuridine is a non-crystalline substance with an offensive odor, readily soluble in water, but insoluble in alcohol and in ether. According to some authorities it is intensely poisonous, while according to others it is not at all poisonous when pure.

Neu'rine, Choline, or **Sincaline,** a basic chemical substance having the empirical formula $C_5H_{15}NO_2$, or the constitutional formula $(CH_3)_3.C_2H_4.OH.NOH$. It occurs in putrefying flesh, in the fly agaric, in ergot, in beet-root juice, and in the actively-growing parts of numerous plants. It may be prepared by boiling pigs' bile or ox-brain with baryta. Neurine is a syrupy body with markedly basic properties and a strongly alkaline reaction. It is not poisonous, but is converted by oxidation into muscarine (q.v.), to which substance the poisonous qualities of the fly agaric are commonly ascribed.

Neuri'tis (N. Lat. from Greek *νεῦρον*, nerve + *itis*, a suffix denoting inflammation), inflammation of a nerve. Multiple neuritis is the inflammation of serveral nerves together. Varying with the cause, neuritis is traumatic, gouty, leprous, endemic, alcoholic, etc. The disease may be acute or chronic, primary or secondary. It results from an inflammation, swelling, and thickening of the nerve-sheath and its prolongations. They may be associated with inflammatory and degenerative changes of the substance of the nerve. The principal symptoms of the disease are persistent burning pain, more or less severe, and a tenderness in the course of the nerve and at the points of its distribution. These are followed by or associated with muscular weakness or paralysis, numbness — loss of sensibility or hyperæsthesia — and atrophy of muscles. The causes of the disease are various; for example, injury to a nerve, as in dislocations and fractures; extension of inflammation from a neighboring part; poisoning by lead, arsenic, mercury or alcohol (see POISONS); gout, syphilis, cancer, diphtheria, and infection. The simpler forms of the disease are usually recovered from, under treatment, in a few weeks, although recovery may be imperfect. In severe forms death may occur in from a week to ten days, from paralysis of the inspiratory muscles, or after several weeks from exhaustion due to continuous pain and bed-sores.

Neuroglia, the connective tissue found in many parts of the nervous system, differing very materially in its general structure from that found in other organs, wherefore it has received its special name. It is also sometimes designated as spider-cells, because of the many-branched processes which the cells possess.

Neurology, that branch of science which treats of the structure and functions of the nervous system. It deals with that system under

all its aspects of form and condition, both in health and in disease, but especially with its pathological states, its hygiene, and its medical treatment. See NERVOUS DISEASES; NERVOUS SYSTEM, EVOLUTION OF THE; NERVOUSNESS.

Neuron. See NERVOUS SYSTEM, EVOLUTION OF THE.

Neurop'tera, the order of "nerve-winged" insects, so-called by Linnæus from the abundant supporting rods or "nerves" which ramify in a network throughout the wings. Since its establishment the original largely artificial group has been much restricted by the separation from it of large divisions. Typical *Neuroptera* have two pairs of large, equal, richly netted-veined, membranous wings, strong biting jaws, conspicuous, many-jointed antennæ, a free prothorax and a complete metamorphosis. This order is of relatively slight economic importance, but the eight or ten families include many common and interesting American insects. See ANT-LION; CORYDALIS; DOBSON; LACEWING; etc.

Neuro'sis (Greek *νεῦρον*, nerve), an affection of the nervous system indicated by disordered sensation, volition, or mental expression, without any recognized lesion of parts, and sometimes without a discoverable adequate cause. Many abnormal conditions are now considered as neuroses; some of them result from nervous dyspepsia, shown by belching and eructation, by spasm and atony of the stomach, due to increased or decreased peristalsis, etc. Cardialgia and cardiospasm (functional disturbances of the heart) may produce such conditions. They are variously described, and include accident-neurosis, a neurosis following a severe injury; traumatic neurosis, following a severe wound; cyclist's neurosis, following excessive bicycle-riding; alcoholic neurosis, due to overuse of alcoholics; occupation-neurosis (see OCCUPATION, HYGIENE OF), indicated by spasmodic manifestations when attempting to perform movements peculiar to the employment of the individual, as the cramps of writers, milkers, etc.; and angioneurosis, a neurosis of the blood-vessels of a part. Herpes zoster is spoken of as a vasomotor neurosis, an exanthematous angioneurosis.

Neurot'ic. As an adjective, this term signifies having relation to the nerves. Physicians speak of neurotic individuals or subjects, neurotic ulceration, neurotic poisons, etc. As a noun the term was formerly chiefly applied in medicine to any substance — drug or poison — which acts especially on the nervous system, neurotics being classified as cerebral (morphine, etc.), cerebro-spinal (as aconite), and spinal (as strychnine). This use of the word neurotics has become obsolescent, and the term is now mainly reserved for sufferers from nervous disease or excessive nervous activity.

Neusatz, noi'zäts, or **Ujvidek,** ooy'vē-dāk, Hungary, a town in the district of Bács, on the Danube, opposite Peterwardein. During the civil war in 1849 it was stormed and taken by the imperial troops under Jellachich, and almost destroyed by the fire of the insurgents from the castle of Peterwardein. It was rebuilt and is now a thriving trading and educational centre. Pop. (1900) 29,296.

Neuse, nūs, a river of North Carolina, which has its rise in the north central part of the State and flows southeast into the Atlantic through Pamlico Sound. Its mouth is an estuary about 30 miles long, and is 10 miles wide at its mouth. It is about 310 miles long and navigable for about 100 miles. A number of streams flow into the Neuse but it has no large tributary.

Neusiedler See, noi'zēd-lĕr-zā, Hungary, a lake in the northwest, between the counties of Ödenburg and Wieselburg, 30 miles southeast of Vienna. Its greatest length, north to south, is 23 miles, average breadth five miles, circuit about 60 miles. It is saline and shallow, its greatest depth seldom exceeding 15 feet; on the east side it is lost in the great morass of Hanság. Large quantities of salt crystallize on its shores in summer, consisting of a mixture of common and of Glauber salt. It contains abundance of fish, such as carp and pike, some of the latter being 70 or 80 pounds weight. Its frequent inundations occasioned great damage, till a canal was cut in 1800, to carry off its superfluous waters and discharge them into the Little Raab. The water several times has disappeared almost entirely. The last occasion was between 1865 and 1870, when crops were grown on its bed.

Neuss, nois, Germany, a town of the Prussian Rhenish province, on the Erft, near its junction with the Rhine, 21 miles northwest of Cologne. It has several fine churches, that of Saint Quirinus founded in 1209 being a notable transitional specimen from the Round to the Pointed style. The numerous industrial establishments include flour and oil mills, iron foundries, machine works, woolen and cotton factories, paper mills, etc. Pop. (1900) 28,484.

Neustadt, noi'stät, or **Wiener-Neustadt,** vē'nĕr-noi'stät, Austria, a town near the Hungarian frontier, on the Kerbach, 13 miles by rail, and by canal, south of Vienna. It retains its mediæval walls, and is dominated by the 13th century Babenburg ducal castle, now a military academy, and noted for its richly decorated Gothic chapel (1460), the burial place of Maximilian I. Locomotives and machinery, sugar, woolens, cottons, ribbons, starch, leather, pottery, wire, etc., are among the manufactures. The city was founded in 1192, and was rebuilt after the great fire of 1834. Pop. (1900) 28,700.

Neustria, nūs'trĭ-a, or **West France,** the name given in the times of the Merovingians and Carlovingians, to the western portion of the Frankish Empire, in contradistinction to Austrasia (q.v.), the eastern portion, the term being derived from *ne* (not) and Austria. The division took place at the death of Clovis in 511. Neustria lay between the Meuse, the Loire, and the Atlantic Ocean; after the cession of the northwestern portion to the Normans in 912, the name was applied to Normandy but soon fell into disuse. See FRANCE.

Neuter, a term formerly applied in zoology to those animals — represented chiefly among the *Hymenoptera* — in which the characteristics of sex are either present in a rudimentary condition or may not be developed at all. They are infertile females. Their status is given in the accounts, in this work of ants, bees, wasps and termites.

Neutral Nation, an American Indian tribe of the Iroquois family, formerly residing on the

north shore of Lake Erie. The French called them the Neutral Nation because they took no part in the long war between the Hurons and the Iroquois. The Hurons afterward made war on the Neutrals and utterly destroyed them.

Neutral Salts. See SALTS; NEUTRALIZATION.

Neutral Tint, in art, a pigment used in water-colors, of a dull-grayish hue partaking of the character of none of the bright colors. It is prepared by mixing together blue, red, and yellow in various proportions.

Neutrality, in international law, a term applied to the status of a state which maintains an attitude of non-interference in respect to an existing war between other states, rendering neither aid nor service to either belligerent in his military operations. The doctrine of neutrality constitutes a large and increasing part of the existing body of international law, but in ancient and mediæval times it occupied almost no place. Grotius, in the first important treatise on international law ever written, gave but an insignificant place to the subject, whereas in any modern treatise it occupies a place hardly second to any. Among the states of the ancient world the status of neutrality hardly ever existed. War rather than peace was the normal state of mankind and when it existed practically all nations participated either as principals or allies. If one nation undertook to pursue a neutral policy it had few rights as such which any of the belligerents felt bound to respect and consequently it was more often to its advantage to choose an able ally as a means of self-protection rather than to remain neutral.

It was among the flourishing maritime states of the Mediterranean region, during the later Middle Ages, that the modern doctrine of neutrality had its origin, and the first recognition of neutral rights was embodied in a famous maritime code, the "Consolato del Mare," which declared that the goods of a neutral were exempt from capture although found on an enemy's vessel. This wise and liberal rule in time came to be adopted by all the European powers and continued as a generally accepted principle of maritime warfare until superseded by the more liberal rule embodied in the Declaration of Paris of 1856. By the latter declaration, which was acceded to by all the nations of Europe and America except Spain, the United States and Mexico, the principle that free ships make free goods was adopted, that is, the goods of an enemy (contraband of war excepted) under a neutral flag, and neutral goods (contraband excepted) under an enemy's flag, are free from capture. The United States refused to give its adhesion to the declaration for the reason that it was disinclined to surrender the right of privateering, the abolition of which was also one of the provisions of the declaration. The United States assumed this position chiefly because of the smallness of its navy and the consequent disadvantage it would suffer in a war with the larger powers were it prohibited from increasing its naval strength by accepting the service of privateers. The government, however, proposed to become a party to the declaration provided a clause were added exempting private property from capture at sea the same as on land but it was never done and the United States has never formally given its adhesion. But as a matter of practice it has observed the rules of the declaration quite as scrupulously as if it had been one of the signatory powers.

Several forms and gradations of neutrality are or were formerly recognized. It may be *qualified,* as where the neutral state is bound by an anterior agreement to furnish one of the belligerents a contingent of troops or a sum of money; or *absolute,* as where the state abstains wholly from interference on the side of either belligerent; or *perpetual,* as in the case of Belgium and Switzerland, whose neutrality and inviolability have been guaranteed by the powers upon considerations which have to do with the preservation of the balance of power among European states; or *armed* as where several neutrals unite for the purpose of enforcing by armed intervention their views of neutral rights as against the aggressions of belligerent powers. The most notable examples of such alliances were the armed neutralities of the Baltic powers in 1780 and 1800 for the purpose of enforcing against England the neutral doctrine that "free ships make free goods." It should be said that international law no longer recognizes the right of a state to maintain a qualified neutrality. If it is under prior treaty obligation to furnish one of the belligerents with men, money or ammunition, however trifling the quantity, it becomes an ally as soon as it undertakes to carry out the treaty stipulations and is no longer entitled to be treated as a neutral.

The obligations and rights of neutrals are determined by the usages of international law, not by those of municipal law. In this connection it should be observed that in judging of the violation of neutral duties a distinction is made between the acts of a state and those which are individual in character. The act of an individual therefore in supplying a belligerent with arms or ammunition would not be considered as a violation by the state of its neutral duties, although it might be a violation of municipal law. It is not sufficient that the neutral treat each belligerent with impartiality; he must abstain from giving aid to either except where the ordinary dictates of humanity require. He must not lend either belligerent money, furnish him with troops or ships of war or any article susceptible of warlike use, or allow his territory to be made the basis of hostile operations or for the organization and equipment of hostile expeditions, or as a recruiting ground for the enlistment of troops, or allow prizes to be brought into his ports and there adjudicated, or allow his subjects to aid in the preparation or organization of a hostile expedition against a friendly power. In the three rules adopted by the Geneva Arbitration Tribunal in the case of the Alabama Claims (q.v.) it was declared to be the duty of neutral governments to use due diligence to prevent the fitting out and departure of such expeditions from their territory, to prevent their ports from being made use of by either belligerent for hostile purposes; and to exercise the same diligence in respect to all persons within their jurisdiction in order to prevent any violations of the foregoing duties. On the other hand, it is not a violation of neutral duty to discharge the duties of humanity to either belligerent as by

allowing a belligerent vessel in distress to seek shelter in the neutral's port for the purpose of obtaining supplies or undergoing repairs or by furnishing asylum to a defeated and fugitive belligerent force. Nor is it at international law a violation of neutral duty when the subject of a neutral government in the ordinary course of trade sells to a belligerent firearms or other supplies which the latter may wish to buy. Likewise he may transport by ship to belligerents whatever they may want, subject, of course, to the right of the other belligerent to capture and confiscate such articles as may be deemed contraband of war. These are legitimate acts of trade unaffected by war, and neutral governments are not expected to interfere with them or assume responsibility therefor. Finally it is not a violation of neutral duty for one state to recognize the belligerency of another state at war or of a part of a state in rebellion against the established government. Nor is it a violation of neutral duty to recognize the independence of a revolted people when the revolt has reached such a stage as to give reason to believe that the revolutionists will establish their independence as a fact and maintain it.

The above enumeration of the duties of neutrals indicates in a rough way the *rights* which belligerents are bound to respect in the conduct of their warlike operations. They may be comprehended under the general head of complete immunity from the acts of either belligerent within their jurisdiction. No act of hostility may be committed by either belligerent within neutral territory nor within its territorial waters. Fugitive troops fleeing from an enemy may not be pursued in neutral territory nor may an armed vessel pursue and capture an enemy's vessel in neutral waters. As a means of enforcing its neutral obligations it is customary for states to enact *neutrality laws,* so called, making it criminal for their citizens or subjects to do certain specified acts which are considered to be violations of neutral duties, but such laws neither increase nor diminish the responsibility of the state enacting them. Consequently the state cannot plead the insufficiency of such laws or inability to execute efficient laws, in extenuation of its offense if it fails to enforce its neutral obligations. The foundation of the neutrality policy of the United States was laid during Washington's administration when upon the outbreak of war between England and France, Washington after a thorough consideration of our obligations to France, under the treaty of 1778, issued a public proclamation announcing that the United States would remain neutral and warned all citizens of the United States to abstain from giving aid to either belligerent. In the year following, Congress passed a neutrality act which as modified in 1818, and again in 1828, constitutes in all essential particulars the neutrality law now in force. It makes it a misdemeanor for any citizen of the United States to accept or exercise a commission to serve a foreign power in a war against a state at peace with the United States; or to enlist or to induce another person to enlist or to go beyond the jurisdiction of the United Sates to enlist in such foreign service; or to fit out, arm or augment the force of any armed vessel to be employed in such service; or to provide the means for setting on foot any military expedition against a friendly state. No belligerent vessel is allowed to provide itself with military supplies in the territory of the United States, and the President is authorized to use force to send out of our territorial waters any vessel not entitled to remain therein. The neutrality laws of Great Britain are embodied in the Foreign Enlistment Act of 1870 and besides provisions similar to those contained in the laws of the United States they contain detailed and stringent regulations designed to prevent the building or equipping in British jurisdiction of ships intended to be used in war against a friendly power.

See also articles on ALABAMA CLAIMS; GENEVA ARBITRATION; INTERNATIONAL LAW; PARIS, DECLARATION OF. For references consult authorities cited under INTERNATIONAL LAW.

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Neu"traliza'tion, in chemistry, the process by which a solution, originally acid or alkaline, is rendered neutral, or brought into a state in which it is neither acid nor alkaline. If the solution is originally alkaline, it is made neutral by the addition of an acid substance; and if it is originally acid, it is neutralized by the addition of an alkali. A solution of caustic potash, for example, is strongly alkaline, and turns red litmus paper blue almost instantly; but if hydrochloric acid is gradually added to it, the alkalinity becomes reduced in proportion to the quantity of acid added, until a state is finally attained in which the solution does not manifest either acid or alkaline properties, and does not affect the color either of red or of blue litmus paper. It is then said to be "neutralized," the neutralization being due to the fact that the potash has entered into combination with the acid to form a salt (potassium chloride) which is neither acid nor alkaline. If more acid is added than is required to effect precise neutralization, the excess renders the solution acid, and in order to make it neutral again, caustic potash or some other alkali must be added. It is often highly important, in chemistry, to effect the precise neutralization of a solution, and a method of quantitative chemical analysis, known as "volumetric analysis," is based upon the determination of the quantities of certain standard acid and alkaline solutions which must be added to the given solution, in order to precisely neutralize it. See CHEMICAL ANALYSIS.

Neuville, Alphonse Marie de, äl-fôńs mārē dė nė-vēl, French painter: b. St. Omer 31 May 1836; d. Paris 20 May 1885. While he was for a short time the pupil of Picot, he must be considered largely a self-taught artist developing his talent under the direction of Delacroix. He made his first appearance as a battle painter with his 'Episode in the Crimean War' (1859), followed by 'The Trench of the Mamelon'; 'Zouave Guard' (Museum of St. Omer); 'The Battle of San Lorenzo in Mexico.' Meanwhile he was producing numerous illustrations for periodicals and for Guizot's 'Histoire de France.' He served as an engineer in the Franco-Prussian war and the second period of his artistic activity began. He tickled the vanity and boastfulness of his countrymen by depicting in his glowing and energetic canvases the French as chivalrous heroes, the Germans

as brutal barbarians, and became the most popular war painter of 'Young France' and the artistic representative of Chauvinism. Among his works with this tendency are: 'Bivouac before the Village of Le Bourget' (1872, Museum of Dijon); 'The Last Cartridge at Balan' (1873, familiar through its many reproductions), and numerous others often photographed or engraved and thus widely distributed. He left many aquarelles and drawings which were eagerly bought up.

Neuville, Jean Guillaume, zhŏń gē-yōm, BARON HYDE DE, French statesman: b. near Charité-sur-Loire, France, 24 Jan. 1776; d. Paris, France, 28 May 1857. He was educated at the Collège Cardinal Lemoine, Paris, and early became an active agent of the exiled Bourbon princes. In 1799 he interviewed Napoleon with the purpose to restore the throne to Louis XVIII., and later his estates were confiscated; but in 1806 upon his agreeing to exile himself to the United States, Napoleon refunded them. With the accession of Louis XVIII. in 1814 he returned to France and in 1815 was elected to the Chamber of Deputies. He was sent to the United States as minister and consul-general in 1816–21 and was then made ambassador to Portugal. In 1830 he became secretary of the navy. He wrote: 'An Historical Eulogy of General Moreau'; etc.

Neva, nē'vä (Russian, nyĕ-vä'), Russia, a river which flows from Lake Ladoga, and after a westerly winding course of 40 miles, has its outlet in the Bay of Cronstadt, an inlet of the Gulf of Finland. It is best known as the river on the delta of which Saint Petersburg (q.v.) is built. The river carries to the sea an enormous volume of water from lakes Ladoga, Onega, Ilmen, and others; in places it is over 4,000 feet wide, elsewhere narrows to 180 feet, and at one or two points navigation is obstructed by reefs and rapids; it is frozen over during five months of the year. The Neva connects with the Volga by the Ladoga Canal, and thus joins the Baltic with the Caspian Sea.

Nevada, nę-vä'dä, **Emma,** stage name of EMMA WIXON, American opera singer: b. Austin, Nev., 1862. She studied in Paris with Marchesi and made her first appearance in opera in London in 1880, as Amina in 'La Sonnambula.' She sang with success in Paris, Italy, and in the United States, where she toured in 1885. In 1885 she was married to Dr. Raymond Palmer.

Nevada, popularly known as "the sage-hen State" and "the sage-brush State," the name being derived from the Spanish, Nevada signifying "snow-covered"; one of the Pacific slope States of the Union and one of the most important from the standpoint of mineral wealth. Nevada is bounded on the west by California; on the south by California and Arizona; on the east by Utah and Arizona, and on the north by Oregon and Idaho. It has an area of 112,090 square miles; extreme length north to south, 484 miles, and width, east to west, 321 miles. Nevada ranks fourth in size among the States of the Union. The capital is Carson City.

Topography.—The northern portion of the State lies in the Great American Basin, included between the Sierra Nevada on the west and the Wahsatch Mountains on the east. This basin forms a plateau 4,000 feet above the sea. There are numerous parallel ranges from 20 to 50 miles apart, running north and south through the State, broken by passes and valleys. In the southwestern portion a few mountains are scattered over an alkali plain. Some of these ranges rise above 9,000 feet. The highest point in the State is Wheeler Peak, near the centre of the eastern boundary, with an altitude of 13,058 feet. Other lofty mountains are White Pine, Piñon, Trinity, Humboldt, Santa Rosa, Lookout, Antelope, Diamond, Granite, Shell Creek, Goshoot, Desert, Opal, and Quartz. The mountains of Nevada show formations of nearly every epoch, from the Azoic to the late Jurassic.

Rivers and Lakes.—The southwestern part of the State has no waterways. The principal river, the Humboldt, rises in the northeast and flows across the State to Humboldt Lake. Several rivers rise in the Sierra Nevada and flow into lakes in the west-central part of the State. These include Walker River, Carson River, and the Truckee River. Pyramid Lake is the largest lake in the State and measures 35 miles in length by 10 miles in width. Lake Tahoe lies on the western boundary at an altitude of over 6,000 feet. It is 21 miles long. There is also Mud Lake, Carson Lake, Walker Lake, and others. In the north is the Owyhee River, a tributary of the Columbia.

Geology and Mining.—The mountains and surface rocks are composed of limestone, calcareous spar, granite, syenite, porphyry, and slate. Volcanic rocks occur in various places, and in the northwestern part of the State there are extensive lava beds. The minerals include silver, gold, antimony, lead, copper, mercury, coal, and nickel, and also sulphur, gypsum, and deposits of salt and borax. The extensive deposits of gold and silver created the State and made it famous through the Comstock Lode (q.v.), which produced as much as $39,000,000 in bullion in a single year. (See GOLD; SILVER.) In 1900 the gold production was 107,364 fine ounces, valued at $2,219,000; silver, 843,400 fine ounces, valued at $1,090,457; copper, 556,775 pounds, and lead, 3,388 short tons. The building stones include limestone, granite, slate, sandstone, agate, and marble. Amethysts, carnelians, and tourmalines are also found.

Banking and Finance.—In the State in 1902, there was but one National bank in operation, having $82,000 in capital, $14,692 in outstanding circulation, and $33,500 in United States bonds. There were also three State banks, with $400,000 in capital, and $110,199 surplus; and one private bank with $25,000 capital and $74,529 in resources. On 1 Jan. 1901 the total bonded debt of the State was $276,600; floating debt, $17,852; and cash in treasury, $260,258. The total assessed valuation in 1900 was $23,692,709, divided as follows: real estate, $15,862,249; personal property, $7,704,209; and net proceeds of mines, $126,251. The State tax rate for 1901 was $8.00 per $1,000.

Irrigation.— Nevada has been the scene of the first work performed under the Irrigation Law passed by Congress in 1902. Work has been begun on what is called the Truckee dam, and the first contract calls for an expenditure of $900,000. The problem of irrigation has become the most prominent local question in Nevada, and the statement is frequently made

that, with a greater supply and distribution of water, Nevada would eventually become one of the foremost agricultural States on the Pacific slope. Chief Hydrographer Newell of the Geological Survey predicts that Nevada will have a population of 500,000 people within 50 years. See IRRIGATION.

Agriculture.— It is the scanty rainfall rather than the poverty of the soil that has given the impression that Nevada is a desert. In 1901, nearly 90 per cent of the improved area was under irrigation, with astonishing results. In the cultivated valleys the crops include spring wheat, barley, oats, potatoes, and vegetables. The State is well suited for stock-raising, which is carried on to a large extent. The white sage brush affords the best of winter pasturage, and much hay is cut along the river bottoms and in the valleys. The breeding of Cashmere and Angora goats is carried on to a limited extent. In 1900 the State had 13,606 dairy cattle, 370,000 meat cattle, 80,000 horses, 3,000 mules, 568,000 sheep, and 16,000 hogs. The forest trees are chiefly pines, firs, and spruces of great size. The foothills are covered with mountain mahogany, dwarf cedar, willow, beech, cottonwood, and wild cherry. Apple, peach, pear, and plum trees flourish and bear excellent fruit.

Commerce and Industries.— Upward of $1,600,000 is invested in the various industries of the State, although there are no manufactures of any particular prominence, the industries being small and varied. This is due largely to a lack of railroad facilities, Nevada having a smaller mileage than any other State in the Union, which is only about 1,000 miles. The Southern Pacific, running east to west through the State, is the principal line with a few smaller or branch roads. In 1900 there were reported by the United States census 261 manufacturing establishments, employing $1,531,789 capital and 617 persons; paying $426,692 in wages, and $832,058 for raw materials; and having an annual output valued at $1,673,880. The principal articles of manufacture include railroad cars, dairy products, flour and grist, printed material, saddlery and harness, clothing, chemicals, boots and shoes, brick and tile, wagons and carriages, confectionery, liquors, lumber and timber products, and salt.

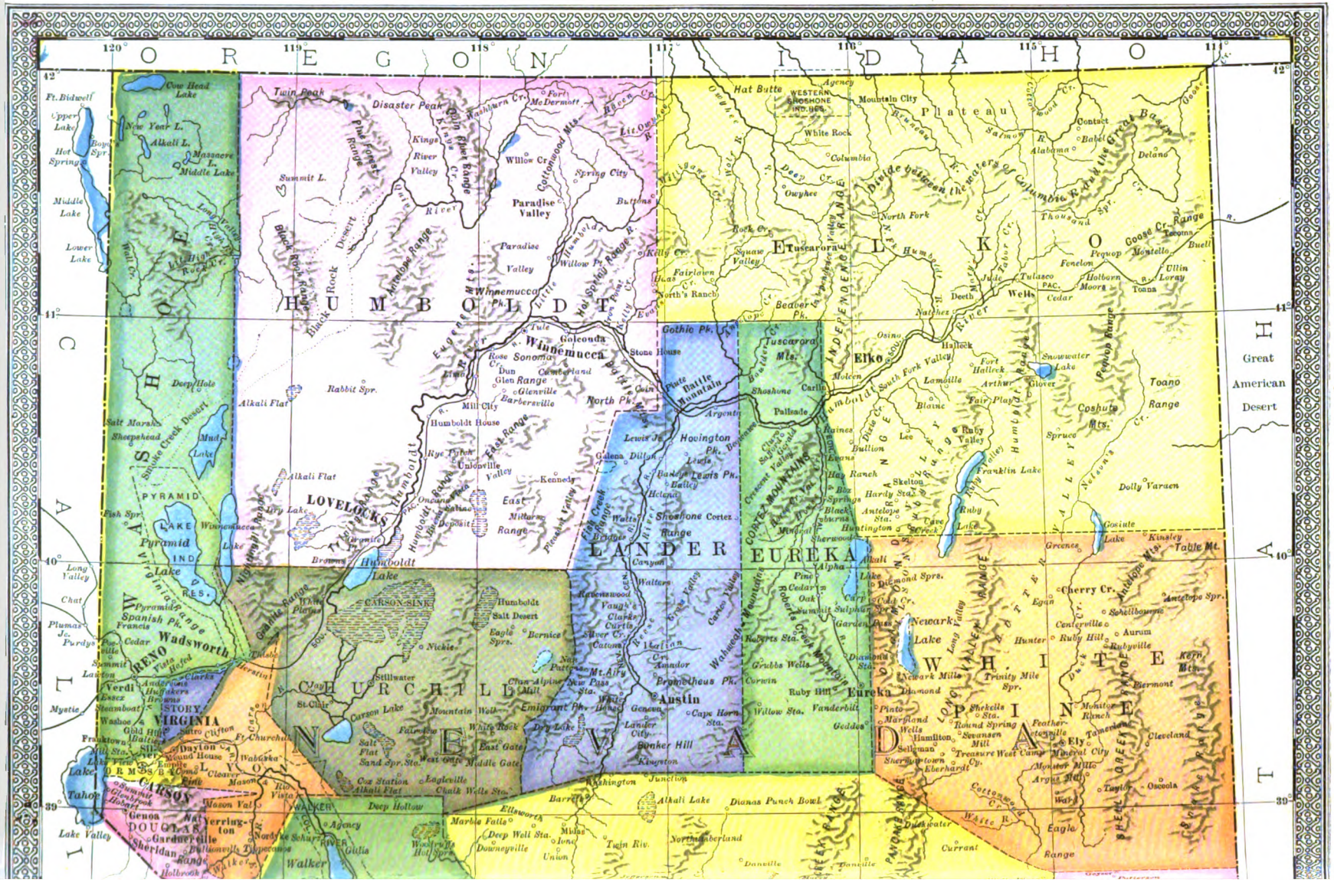
Government.—The State is governed by the original constitution of 1864. Suffrage is restricted to male citizens 21 years of age, who have resided in the State six months and the district or county 30 days. The number of members of both branches of the legislature cannot exceed 75. Assemblymen serve two years and senators four years. Both are elected on the Tuesday after the first Monday in November of even years. A governor, lieutenant-governor, secretary, treasurer, controller, surveyor-general, and attorney-general are elected at the same time and serve for four years. There is a supreme court, district courts, and justices of the peace. A system of county and township government is established by the legislature. The State maintains an orphans' home, at Carson; a hospital for mental diseases, at Reno; and a State penitentiary at Carson.

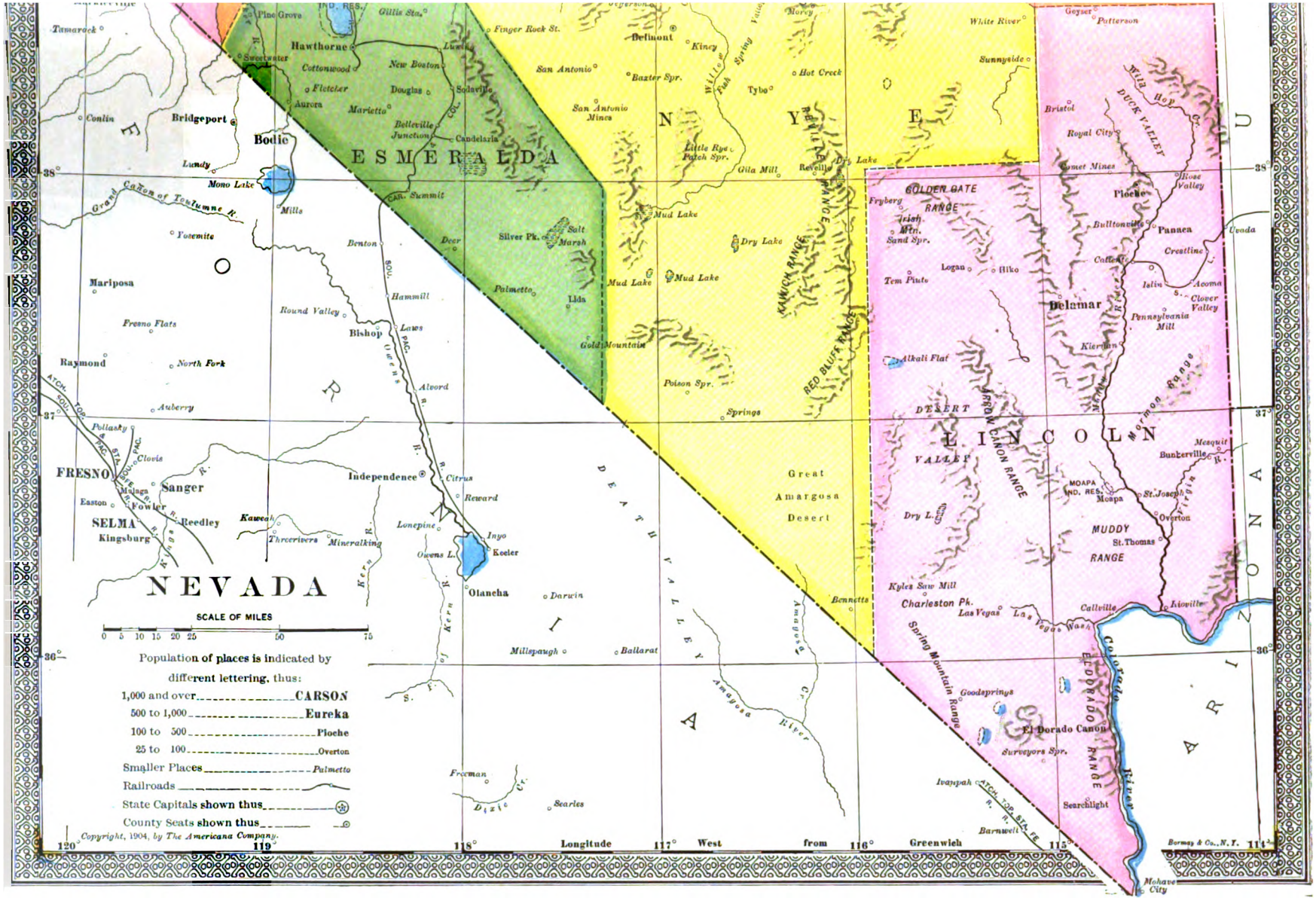
Education.— In 1902 the children of school age in the State numbered about 8,000; average daily attendance 4,860. The public schools are maintained by State and local taxes and are in charge of a State Board of Education and three superintendents. Education is compulsory. There are 400 pupils in the high schools and over 300 in the Nevada State University (q.v.), a coeducational institution located at Reno, in connection with which the United States government has established an agricultural experiment station. The government also maintains a school for Indian children. The public school property is valued at $284,563. The receipts for the year amounted to $225,926, and the expenditures, $225,622. For higher education there are public high schools at Austin, Carson City, Elko, Eureka, Gold Hill, Reno, and Virginia City.

Churches.— The strongest denominations in the State are the Roman Catholic, Protestant Episcopal, Mormon, Methodist Episcopal, and Presbyterian. In 1901 there were 59 Evangelical Sunday-schools, with 868 officers and teachers, and 3,342 scholars.

Political.— Nevada, more than any other State in the Union, is largely controlled politically by local interests. It was counted as Republican up to 1892, when it cast its vote for the candidates of the People's Party. In 1896 it voted for free silver, and again in 1900 cast its vote for William J. Bryan for President. The first and only Territorial governor was James W. Nye (1861–4). In the State elections Nevada has elected five Republican governors, two Democratic governors, two Silver Party governors, and one Silver-Democratic governor. In 1901 there were 188 post-offices of all grades; and 30 periodicals, of which 7 were daily, 2 semi-weekly, 20 weekly, and 1 semi-monthly. The principal newspapers are the Virginia *Chronicle,* the Carson *Appeal,* and the Reno *Cazette.*

History.— Nevada was originally a part of California, known as "the Washoe Country," until it was organized as a Territory in 1861. It was first visited by the white man in 1775, when Francisco Garcés, a Franciscan friar, stopped here on his way to California. In 1825 Peter Ogden, of the Hudson Bay Company, visited the Humboldt River, which for a time was called the Ogden. In 1826 Jedediah S. Smith crossed the State from west to east. Frémont passed through the State in 1843–4–5, and occasional immigrants to Oregon or California settled here. In 1849 the Mormons founded a trading post on the Carson River, near Genoa. A part of the State was included in Utah Territory, when it was organized in 1850, but in 1853 the settlers in the Carson Valley petitioned to be annexed to California, claiming that Utah did not protect them. A petition for Territorial government was sent to Congress in 1857, and in 1858 a provisional government was formed at Carson City with Isaac Roop as governor. In 1860 another petition was sent to Congress and the Territorial delegate applied for admission. The Comstock Lode was discovered in 1859, and miners flocked into the district from the east and north and from California. At the outbreak of the Civil War the scanty population sent loyal troops to the front and Nevada citizens donated $50,000 in silver bricks to the Sanitary Commission. In September 1863 an election was held for delegates to form a State constitution, but the proposition was defeated in January 1864. The political situation made two additional Republican votes in the United States


OREGON
IDAHO
HUMBOLDT
LOVELOCKS
LANDER
EUREKA
WHITE PINE
CHURCHILL
LYON
STOREY
WASHOE
CARSON
DOUGLAS
ALPINE
MINERAL
NYE
ESMERALDA
Great American Desert
Pyramid Lake
Winnemucca
Paradise Valley
Golconda
Battle Mountain
Elko
Wells
Tuscarora
Gosiute
Toano Range
Coshute Mts.
Ruby Valley
Franklin Lake
Dolly Varden
Humboldt House
Unionville
Kennedy
Lovelock
Oreana
Rye Patch
Humboldt Lake
Carson Sink
Humboldt Salt Desert
Reno
Wadsworth
Verdi
Virginia City
Gold Hill
Silver City
Dayton
Carson City
Lake Tahoe
Genoa
Gardnerville
Minden
Sheridan
Walker Lake
Walker River
Yerington
Schurz
Fallon
Stillwater
Fallon
Carson Lake
Salt Flat
Sand Spr. Sta.
Fairview
White Rock
East Gate
West Gate
Middle Gate
Eagleville
Coz Station
Alkali Flat
Chalk Wells Sta.
Washington
Barrett
Alkali Lake
Dianas Punch Bowl
Marble Falls
Deep Well Sta.
Downeyville
Twin Riv.
Northumberland
Danville
Currant
Austin
Cape Horn Sta.
Bunker Hill
Kingston
Emigrant Pk.
Mt. Airy
Prometheus Pk.
Amador
Cortez
Hoosier Pass
Diamond Sta.
Ruby Hill
Eureka
Willow Sta.
Vanderbilt
Geddes
Roberts Creek Mts.
Grubbs Wells
Corwin
Newark
Newark Lake
Newark Mills
Trinity Mine Spr.
Diamond
Pinto
Shekells Sta.
Round Spring
Sevanson Mill
Hamilton
Sellgman
Ely
Treasure West Camp
Mineral City
Monitor Mills
Argus Mill
Eberhardt
Cherry Creek
Egan
Centerville
Ruby Hill
Aurum
Rubyville
Antelope Spr.
Schellbourne
Hunter
Kern Mts.
Piermont
Monitor Ranch
Tamarack
Cleveland
Taylor
Osceola
Cottonwood Cr.
Ward
Eagle Range
Pancake Range
Schell Creek Range
Snake Range
Egan Range
Antelope Mts.
Table Mt.
Kinsley
Greenes
Lake
Pilot Peak
Goose Cr. Range
Deep Hole
Alkali Flat
Rabbit Spr.
Salt Marsh
Sheephead
Smoke Creek Desert
Mud Lake
Fish Spr.
Long Valley
Chat
Plumas Jc.
Purdys
Spanish Pk.
Francis
Cedar
Spanish Mts.
Granite Range
Pah Rah Range
Virginia Range
Truckee River
Humboldt River
Carson River
Walker Lake
Pyramid Lake
Lake Valley
Mystic
Steamboat
Washoe


NEVADA
ESMERALDA
NYE
LINCOLN
MONO
INYO
KERN
FRESNO
MARIPOSA
ARIZONA
DESERT
Great Amargosa Desert
DEATH VALLEY
Amargosa R.
Amargosa Range
Kawich Range
Red Bluff Range
Golden Gate Range
Meadow Valley Range
Arrow Canon Range
Muddy Range
Spring Mountain Range
Eldorado Range
Colorado River
Virgin R.
Moapa Ind. Res.
Moapa
Overton
St. Joseph
Bunkerville
Mesquite
Logandale
Callville
Kiowville
Las Vegas
Las Vegas Wash
Charleston Pk.
Kyles Saw Mill
Goodsprings
El Dorado Canon
Surveyors Spr.
Searchlight
Ivanpah
Barnwell
Bennetts
Dry L.
Delamar
Pioche
Panaca
Caliente
Crestline
Uvada
Rose Valley
Clover Valley
Pennsylvania Mill
Irish Mtn.
Sand Spr.
Bulltonville
Fryberg
Tem Piute
Logan
Hiko
Alkali Flat
Kiernan
Meadow Valley Wash
Bristol
Royal City
Comet Mines
Geyser
Patterson
White River
Sunnyside
Hot Creek
Tybo
Kingston Wash
Belmont
Kingston
Morey
Willow Creek
Fish Spring Valley
San Antonio
Baxter Spr.
San Antonio Mines
Little Rye Patch Spr.
Gila Mill
Reveille
Dry Lake
Mud Lake
Dry Lake
Silver Pk.
Salt Marsh
Palmetto
Lida
Gold Mountain
Poison Spr.
Springs
Benton
Deer
Hammill
Round Valley
Bishop
Laws
Alvord
Owens R.
Owens L.
Inyo
Keeler
Olancha
Darwin
Lone Pine
Citrus
Reward
Independence
Kawean
Threerivers
Mineralking
Millspaugh
Ballarat
Kern R.
South Fork of Kern R.
Kern Lake
Freeman
Dixie Cr.
Searles
Sanger
Reedley
Fowler
Selma
Kingsburg
Easton
Clovis
Pollasky
Auberry
North Fork
Fresno Flats
Raymond
Yosemite
Grand Canon of Tuolumne R.
Mono Lake
Lundy
Bodie
Bridgeport
Conlin
Tamarack
Mills
Benton
Sweetwater
Hawthorne
Cottonwood
Fletcher
Aurora
Marietta
New Boston
Douglas
Solvville
Belleville Junction
Candelaria
Lucin
Finger Rock St.
Pine Grove
Gillis Stn.
Ind. Res.
Carson & Colorado R.R.
Virginia & Truckee R.R.
Nevada Central R.R.
Tonopah & Tidewater R.R.
Atch. Top. & Santa Fe R.R.
Southern Pacific R.R.
Los Angeles & Salt Lake R.R.
Carson Summit
Mono
Tuolumne
Fresno
Kings
Tulare
Kern
Inyo
Mariposa
Esmeralda
Nye
Lincoln
SCALE OF MILES
0 5 10 15 20 25 50 75
Population of places is indicated by different lettering, thus:
1,000 and over ..... CARSON
500 to 1,000 ..... Eureka
100 to 500 ..... Pioche
25 to 100 ..... Overton
Smaller Places ..... Palmetto
Railroads .....
State Capitals shown thus .....
County Seats shown thus .....
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Bormay & Co., N. Y.
Longitude West from Greenwich
120° 119° 118° 117° 116° 115° 114°
38° 37° 36°

Non

Senate exceedingly desirable, and Congress, in March 1864, again passed an enabling act, in July the constitution was accepted, and the State was admitted 31 Oct. 1864. The great Sutro Tunnel (q.v.) designed to drainage and access to the mines of the Comstock Lode, was constructed in 1879. The silver product of the State from 1859 to 1869 amounted to $137,382,000, and this had much to do with gaining Nevada a place in the Union.

Population.— In 1883 Nevada at its zenith had a population of 66,265, including 3,152 Chinese and 4,000 Indians. In 1903 the population was about 40,000. The census for 1890 reported a population of 45,761, and in 1900 of 42,335. The decline of the mining industry of the State, and failure to develop in other directions, has caused the diminution of population. It now has the fewest inhabitants of any State. The capital city is Carson, pop. (1891) 3,950; (1901) 2,100. The largest city is Virginia City, pop. (1891) 8,571; (1901) 2,695. Reno is next in size, pop. (1891) 3,563; (1901) 4,300.

Bibliography.—Angell, 'History of Nevada' (1881); Bancroft, 'Nevada' (1890); 'Nevada and Her Resources' (1894).

Nevada, Iowa, city, county-seat of Story County; on a branch of the Chicago & Northwestern railroad; about 30 miles north by east of Des Moines. It is in an agricultural region in which stock-raising is a prominent industry. Its chief manufactures are flour, brick, tile, lumber and dairy products. It has a large cold-storage plant, and considerable trade in dairy products, poultry, eggs, grain, flour, and live-stock. The public library contains about 5,500 volumes. Pop. (1890) 1,662; (1900) 2,472.

Nevada, Mo., city, county-seat of Vernon County; on the Missouri, K. & T., and the Missouri P. R.R.'s; about 130 miles southwest of Jefferson City and 100 miles south of Kansas City. It was settled about 1830 by a colony from the eastern part of the State, incorporated in 1865 or 1866, and chartered as a city in 1883. It is in an agricultural and stock-raising region, and in the vicinity of the zinc mines. Its manufactures are chiefly local. The number of men employed in railroad shops and manufacturing establishments is about 1,000. The city has considerable trade in agricultural products and live-stock, and it is a distributing centre for a large part of Vernon County. Its educational institutions are public schools, Cottey College for Young Women, opened in 1884 under the auspices of the Methodist Episcopal (South) Church, and Saint Francis Academy (R. C.). It has an orphan asylum, the State Lunatic Asylum, and Artesian Lake Park. The three banks have a combined capital of $250,000. The government is vested in a mayor and a council of 10 members, who hold office two years; five councilmen are elected each year. Pop. (1890) 7,262; (1900) 7,461.

Nevada State University, first founded at Elko in 1873, then removed to Reno and opened in 1886. It is a part of the public educational system of Nevada and the only school of collegiate grade in the State. Besides the regular collegiate courses in the classics, literature and general science, there are courses in agriculture, civil, mechanical, and mining engineering, and domestic science; also a business course; a normal and a preparatory department. In the agricultural department short winter courses are offered in agriculture, dairying and domestic science. In 1901 a branch school of mines was established at Virginia City under the head of university extension. The State Experiment Station is also connected with the university. The degrees conferred are A.B. and B.S., with the corresponding masters' degrees for graduate work. Women are admitted and constitute fully half the number of students; military drill for the men is a part of the curriculum. As the agricultural department is connected with the university, it receives the income from the Federal land grants for agricultural colleges; the total income in 1903 amounted to $60,000. The students numbered 392, and the faculty 24.

Névé, nā-vā. See GLACIER.

Nevers, nē-vār, France, the capital of the former province of Nivernais, now of the department of Nièvre, picturesquely built on the slope of a hill 600 feet above sea-level, at the influx of the Nièvre to the Loire, 159 miles southeast of Paris. It was the Roman Noviodunum, and has been an episcopal see since 506; its 13th century cathedral has been restored since 1879; the 11th century Romanesque church of St. Etienne is interesting. The stately court-house, dating from 1475, was formerly the castle of the Dukes of Nevers. The city contains a fine public garden, a bridge of 14 arches over the Loire, a mediæval gateway, housing a museum of Gallo-Roman antiquities, and a triumphal arch (1746) commemorating Fontenoy. The industries comprise the manufacture of cannon, iron cables and chains, porcelain (introduced by Italians about 1565), etc. Pop. (1900) 27,673.

Nev'ersink Highlands. See NAVESINK HIGHLANDS.

Neville, nĕv'ĭl, **Henry,** English actor: b. Manchester 20 June 1837. He achieved great success on the London stage, where he first appeared in 1860, and later took the chief role in 'The Ticket of Leave Man.' He was lessee of the Olympic in 1873–9, and established a dramatic school in 1884. Besides plays, such as 'The Duke's Device' and 'The Violin-Maker,' he wrote 'The Stage: Its Past and Present'; 'Gesture' (in Campbell's 'Voice, Speech, and Gesture,' 1895).

Neville, Richard, earl of Warwick. See WARWICK, RICHARD NEVILLE, EARL OF.

Neville's Cross, Battle of. See BRUCE, DAVID.

Nev'in, Ethelbert Woodbridge, American composer: b. Edgeworth, Pa., 25 Nov. 1862; d. New Haven, Conn., 17 Feb. 1901. He obtained his musical education in Pittsburg and in Berlin and after three years spent in the latter city returned to the United States and opened a studio in Boston. He appeared in public occasionally but his reputation rests chiefly upon his compositions which date from his 12th year. 'Narcissus,' which has a world-wide popularity, was written when he was 13, and 'O, that we Two were Maying' a year later. Other compositions are: 'A Day in Venice'; 'Cradle Song'; 'Milkmaid's Song'; etc.

Nevin, John Williamson, American Reformed (German) clergyman: b. Shippensburg,

Pa., 20 Feb. 1803; d. Lancaster, Pa., 7 June 1886. He was graduated from Union College, Schenectady, N. Y., in 1821 and from Princeton Theological Seminary in 1826, where he remained for a few years as tutor. He was professor of Hebrew at the Presbyterian Theological Seminary at Allegheny City 1829–39, became president of the Mercersburg Theological Seminary in 1840 and was president of Marshall College 1841–53. His translation of Schaff's 'The Principle of Protestantism' created the once famous controversy over 'Mercersburg Theology' (q.v.), of which he was for the rest of his life the principal advocate. He edited the Mercersburg 'Review' 1849–53, resigned from the presidency of the Seminary in 1851 and from Marshall College in 1853. In the last named year the college was removed to Lancaster, Pa., and merged with Franklin College, Dr. Nevin serving as president of Franklin and Marshall College (q.v.) 1866–76. He published 'The Mystical Presence' (1846); 'The History and Genius of the Heidelberg Catechism' (1847); 'Antichrist or the Spirit of Sect and Schism' (1848).

Nevin, Robert Jenkins, American Episcopal clergyman: b. Allegheny, Pa., 24 Nov. 1839. He was a son of John Williamson Nevin and was graduated from Franklin and Marshall College, Lancaster, Pa., in 1859; he served through the Civil War in the Union army, attaining the rank of brevet-major. He was ordained in 1867 and since 1869 he has been rector of St. Paul's American Church in Rome which he built in 1870–6. He has written: 'St. Paul's within the Walls' (1878); 'Reunion Conference at Bonn' (1875); etc.

Nev'ins, Winfield Scott, American journalist: b. Brunswick, Maine, 6 Dec. 1850. He has been connected with the Boston *Herald* for 30 years and was president for four years of the school board of Salem, Mass. He has published 'Old Naumkeag' (with Webber) (1878); 'Guide to North Shore of Massachusetts' (annually, 1880–96); 'The Intervale, New Hampshire' (1887); 'Witchcraft in Salem Village' (1892).

Nev'inson, Henry W., English journalist. He was a war correspondent of the London *Daily Chronicle* during the Græco-Turkish war of 1897, and also from the Transvaal and Natal during the Boer war in 1899. He has published 'Life of Schiller' (1889); 'Neighbors of Ours' (1895); 'In the Valley of Tophet' (1890); 'The Thirty Days' War' (1898); 'Ladysmith' (1900); 'The Plea of Pan' (1901).

Nev'is, West Indies, one of the Leeward Islands, belonging to Great Britain, two miles southeast of Saint Christopher, with which, since 1882, it is administratively connected. It is circular in form, rises in the centre to a wooded ancient crater (3,200 feet), and has an area of 50 square miles. The lower slopes are cultivated, the sugarcane being the principal crop; limes and oranges are grown to a small extent. The capital is the port of Charlestown. Nevis was discovered by Columbus in 1498 and colonized by England in 1628. In the 18th century it was twice taken and restored by the French. Pop. (1900) 15,305.

New, Clarence Herbert, American author: b. New York 1862. He was educated at the Polytechnic Institute of Brooklyn, and engaged in travels which took him all over the world. In 1886–92 he was a constructing engineer and became lieutenant of naval volunteers in 1891–3. Since 1898 he has been a publisher. He has written: 'Franc Elliot' (1894); 'Chronicles of Murphy's Gulch' (1898); etc.

New, John Chalfant, American financier: b. Vernon, Ind., 6 July 1831. He was graduated from Bethany College, Va., in 1851 and studied law, becoming clerk of Marion County in 1856. In the Civil War he served as quartermaster of Indiana until his election to the State senate in 1862. He was cashier of the First National bank of Indianapolis in 1865 and later became its president. He was United States treasurer in 1875–6 and served as assistant treasurer in 1882–4. He was appointed consul-general at London in 1889 by President Harrison and is at present proprietor of the Indianapolis *Journal.*

New Al'bany, Ind., city, county-seat of Floyd County; on the Ohio River, and on the Baltimore O. & S., the Pittsburg, C. C. & St. L., the Louisville, E. & St. L., and the Louisville, N. A. & C. R.R.'s; nearly opposite Louisville, Ky., and about 110 miles south of Indianapolis. It was laid out for a city in 1813, and in 1839 was incorporated. It is two miles below the falls in the Ohio River (See LOUISVILLE) and has extensive water-power. Its chief manufacturing establishments are large glass works, pork-packing establishments, tanneries, engine and boiler works, furniture factories, flour mills, rolling mills, lumber and planing mills, and foundries. It has a large trade in its manufactures, the farm products of Floyd County, and in building material. Some of its prominent buildings are the government building, the city-hall, court-house, fair-ground buildings, the churches, and the schools. It is the seat of De Pauw College for women, Saint Mary's Academy (R.C.), Holy Trinity Academy (R.C.); it has public and parish schools and a free public library. Outside the city limits is a National cemetery in which are 2,908 graves, 676 of unknown dead. The government is administered under the charter of 1839 and provides for a mayor, who holds office four years, and a council. Some of the administrative officials are appointed by the mayor and the others are elected by the council. Pop. (1890) 21,059; (1900) 20,628.

New Al'bion, the name given by Sir Francis Drake, in 1579, to the coast of North America. Humboldt and later writers restricted the name to the region between San Francisco and what is now the northern boundary of the State of Oregon.

New Am'sterdam. See NEW YORK.

New Archangel. See SITKA.

New Atlan'tis. See ATLANTIS.

New Bed'ford, Mass., city, port of entry, one of the county-seats of Bristol County; on the Acushnet River and New Bedford Harbor, an arm of Buzzard's Bay; and on the New York, New Haven & Hartford railroad. It is connected with Fall River, Brockton, Onset, and Dartmouth by electric lines, and by steamers with New York, Martha's Vineyard, and other places, and is 56 miles south of Boston. It was settled in 1652 by John Cook and others from Plymouth, and was a part of Dartmouth until

it was incorporated in 1787; chartered as a city in 1847. It was once noted for the number of its inhabitants engaged in the whale fisheries, but since 1860 its whaling interests have decreased and its manufacturing industries increased. The town occupied a prominent place in the Revolution, especially in sending out privateers which harassed the enemy and captured many of the British vessels. On 5 Sept. 1778 the town was attacked by a British fleet, captured and almost destroyed. The harbor is protected by Fort Rodman, on Clark Point. A large lighthouse is on Palmer Island at the entrance of the harbor. The area of New Bedford is nearly 20 square miles. It is well laid out, the streets are clean and nearly all paved. Fine roads along the shore, good views of the sea, opportunities to go out into the country on electric cars, all add to the attractiveness of the city which is now a most important manufacturing centre. The chief manufacturing establishments are 41 cotton mills (1904), representing a capital of $24,000,000, and having 1,603,080 spindles and 16,000 employees; the Twist Drill Company, 500 employees; cordage works, 400; one of the large shoe factories has 500 employees; woolen mill, 200; glass works, 300; paint works, 500; and 50 other industries, all giving employment to thousands of people. In 1902 New Bedford received 215,000 bales of cotton, new cotton mills were erected, and the old mills enlarged. New Bedford ranks first of the cities of the United States in the manufacture of fine cotton goods and fine cotton yarns, and second in the number of spindles. The total number of building-permits granted during 1902 was 470, at an estimated cost of $2,000,000. The city has an extensive trade; its manufactured articles are exported to nearly all parts of the world. The coal received at its docks (1904) amounts to over 600,000 tons annually, and it is a distributing centre for large quantities of food products which are brought from other parts of the United States and from other countries. Among the prominent buildings are the government building, the city-hall, county court-house, the Merchants' National Bank, Masonic and Odd Fellows' buildings, Saint Luke's Hospital, Saint Mary's Home for Aged and Orphans, and a State Armory. The public parks have a combined area of about 260 acres. The bridge which spans the harbor and connects Fairhaven and the east side with the city cost $1,500,000. The educational institutions are 30 public schools, five parish schools (R.C.), the Swain Free School, a State Textile School, a kindergarten (R.C.) and a public library which contains about 74,000 volumes. This library was founded in the early part of the 19th century, but did not become a municipal institution until 1856. There are 50 churches several of which are fine buildings. The national and trust company banks have a combined capital of $2,800,000; the savings banks have deposits (1903) amounting to $22,161,694.

The government is administered under the revised charter of 1896 which provides for a mayor, elected annually, a board of aldermen and a council. There are 6 aldermen and 24 members of the council, 4 from each ward. The mayor appoints, subject to approval of the board of aldermen, the license and the park commissions and the board of health. The council elects the officers of the fire department, the overseers of the poor, and the water board. There are two sources of supply of water, one opened in 1869, the other in 1899. The whole cost the city about $3,150,000. The water of the first plant is now held in reserve for emergencies, and great precautions are taken to have an uninterrupted flow of water in case of fire. There are now about 110 miles of water mains. The annual municipal expenditures for maintenance and operation are about $1,010,000. The chief items of expense are, for schools, $236,000; for police department, $114,000; streets, $71,000; fire department, $81,000; charitable institutions, $75,000; lighting, $50,000; interest on debt, about $150,000. There is a large foreign element, chiefly French Canadian, in the city, but all who have made permanent homes here are becoming American. The nationalities represented (1 Jan. 1904), are about as follows: French Canadian, 15,000; Portuguese, 12,000; English, 10,000; German, 2,000. The total population (1890) 40,733; (1900) 62,442; (1 Jan. 1904) about 78,000.

Consult: Rickeston, 'History of New Bedford'; 'Centennial in New Bedford.'

G. A. HOUGH,
Editor, 'Evening Standard.'

New Braunfels, brown'fĕlz, Texas, city, county-seat of Comal County; on the Guadaloupe River, at the mouth of the Comal, and on the Missouri, K. & T., and the International & G. N. R.R.'s; about 50 miles southwest of Austin, the capital, and 30 miles northeast of San Antonio. The short stream called Comal River has its source in artesian springs, and furnishes the city industries with an extensive volume of water. It is in a productive agricultural region in which stock-raising is given considerable attention. The chief manufacturing establishments are large flour mills, tannery, brick works, wagon factory, and cottonseed-oil mills. The trade is chiefly in wheat, flour, cotton, and live-stock. The inhabitants are nearly all Germans or of German descent. Pop. (1890) 1,608; (1900). 2,097.

New Brighton, brī'tŏn, Pa., borough, in Beaver County; on the east bank of Beaver River; two miles from its junction with the Ohio, and on branches of the Pennsylvania and the Pittsburg & L. E. R.R.'s; 28 miles northwest of Pittsburg. It was settled in 1799 by the laborers employed to build Wolf's mill,—a flouring mill; laid out in 1818, and incorporated as a borough in 1838. Coal-fields and fire-clay beds are in the vicinity. It is in a section of the State in which manufacturing and industries connected with coal are prominent. The good water power furnished by Beaver River is utilized in a number of manufactories, chief of which are potteries, coffee mills, flour mills, wire, rivet, and nail factories, brick and sewer pipe works, twine factory, iron enameled bath tub works, fire-engine, keg, and brass casting works. There are about 1,000 employees in the manufacturing establishments. There are 10 churches, 12 public schools, and one parish school. It has the Beaver Valley General Hospital, a public art gallery and library, and a park. The three banks have a combined capital of $1,150,000. The government is vested in a burgess and a council of 12 members. About three fourths of

the population are native born Americans. Pop. (1890) 5,616; (1900) 6,820.

New Brighton. See RICHMOND, BOROUGH OF.

New Britain, brĭt'n, Conn., city, in Hartford County; on the New York, N. H. & H. railroad; about 11 miles southwest of Hartford. It was settled in 1687 and remained a part of Berlin until 1850 when it was incorporated as a town. In 1871 it was granted a city charter. It is in an agricultural region, but is noted for its extensive manufacturing interests. The chief manufactures are: stamped ware, hardware, foundry and machine-shop products, knit goods, hosiery, and cutlery. The trade is chiefly in the manufactured goods, but it is a distributing centre for quite a number of the nearby villages. It has a park, area, about 80 acres, well-kept streets, and a large number of fine church buildings. It is the seat of a State Normal School and the New Britain Institute; it has good public and parish schools.

The revised city charter of 1896 provides for a mayor, who holds office two years, and a council. Some of the administrative officials are appointed or elected by the mayor and council. The sheriff, city clerk and assistant, collector, treasurer, and auditor are elected by popular vote. The town elects the school board. The city owns and operates the waterworks. Elihu Burritt (q.v.) was born in New Britain and lived here nearly all his life. Pop. (1890) 16,519; (1900) 25,998.

New Britain. See NEW POMERANIA.

New Brunswick, Canada, a maritime province on the east coast, bounded northwest and north by the province of Quebec and Chaleur Bay, east by the Gulf of Saint Lawrence and Northumberland Strait, the latter separating it from Prince Edward's Island; south by Nova Scotia and the Bay of Fundy, and west by Maine, United States; area, 28,200 square miles, of which 100 square miles are water.

Topography.—The general surface of the country presents a series of bold undulations, sometimes rising into mountains or continuous ridges of high land. The latter are seldom of any considerable height, but their precipitous acclivities, sharp outline and deep ravines give them a picturesque character that finely and strikingly contrasts with the rich valleys and sheltered plains which alternate with the more rugged scenery. The shores of the Gulf of Saint Lawrence and Northumberland Strait, however, present different and less pleasing features. There the land for about twelve miles inland is low and sandy, covered with trees of a stunted growth, and skirted with extensive marshes, and long sand-beaches, on the southern portion of the east coast there are numerous small harbors. The whole coast line about 540 miles in length, is interrupted only at the point of junction with Nova Scotia, where an isthmus of not more than 14 miles in breadth connects the two territories and separates the waters of Northumberland Strait from those of the Bay of Fundy. Across this isthmus the Chignecto ship-railway has been constructed. The most extensive indentations and harbors are Chaleur and Nepisiquit bays on the north coast, Miramichi Bay, on the east coast; the Bay of Fundy, Chignecto Bay, Passamaquoddy Bay, and Saint John Harbor on the south coast.

Hydrography.—The principal rivers are the Saint John, 450 miles long, navigable for vessels of 100 tons to Fredericton, 90 miles from its entrance into the Bay of Fundy, and forming the boundary with the United States for a considerable distance; the Miramichi, 225 miles long, which falls into the bay of the same name, and is navigable for large vesels 25 miles from the gulf; the Restigouche, 200 miles long, and three miles wide at its entrance in Chaleur Bay. The largest lakes, which are in the south of the province, are Grand Lake, 25 miles long by about 5 miles broad; and Washedemoak Lake, about 20 miles long by 2 miles broad, both lying between Saint John and Fredericton.

Geology and Mineral Resources.—Along the shores of Chaleur Bay and the Gulf of Saint Lawrence gray sandstone and gray clay-slate predominate, with detached rocks of granite, quartz, and iron-stone; on the south coast, limestone, clay-slate, with sandstone, interrupted occasionally by gneiss, trap, and granite. Specimens of amethyst, carnelian, jasper, etc., have been found in various places. Coal is plentiful, and iron-ore abundant; the former is said to extend over 10,000 square miles, or above one third part of the whole area, and is worked. Copper and manganese also abound. Gypsum, limestone, and freestone abound. Salt springs, strongly saturated, are numerous; and some sulphurous springs have also been discovered.

Climate.—The climate, like that of other portions of the North American continent, is subject to extremes of heat and cold. The severest cold of the winter usually continues from 21 December to 21 March. The prevailing summer winds are from the southwest and south; when from the southwest dense fogs are often produced on the shores of the Bay of Fundy, and stretch 15 miles to 20 miles inland. In the interior the climate is said to have been greatly ameliorated in consequence of the clearing away of the forests, by which the sun's rays are permitted to reach the surface of the earth, where the heat thus absorbed is again diffused by radiation. It is stated, as a result of this process, that the winters are reduced to nearly half their former duration. The climate is, on the whole, healthful, and the autumn, as in other parts of the North American continent, is a season of exceeding beauty, the air being dry and clear, and the woods glowing with innumerable tints of the richest and most brilliant hues.

Vegetation, etc.— New Brunswick is one of the most densely wooded regions of the world, the usual variety of North American trees being found; the forests supply three fourths of the total exports, pine constituting the principal lumber. A large portion of the soil is adapted for agriculture, but only a small part is developed. Indian-corn is grown in the south part of the province; flax, wheat and other cereals, turnips and good potatoes are raised. The wheat of New Brunswick is of the best quality and is said to be much heavier than that of the United States. In 1901 26,010 acres, yielding 478,886 bushels, were devoted to wheat culture; 184,114 acres, yielding 4,944,992 bushels, were devoted to the production of oats. Great attention is given to the improvement of live stock, sheep and cattle predominating.

Fisheries.—The rivers and lakes, and the great extent of the coast with its numerous deep bays, coves, and inlets afford great scope for the pursuit of the fishing industry, which, however, has not received the development its importance merits. Still New Brunswick ranks third among Canadian provinces in its fish products, the value of its catches in 1900 being $3,769,742.

Commerce and Manufactures.— Owing to its cheap coal, lumber, etc., and its proximity to the markets of the world, New Brunswick is expected to develop as a manufacturing state, especially since the railway system has been completed connecting with the rest of Canada and with the United States. Shipbuilding, formerly more important, is still carried on at Saint John. The manufacture of timber in various forms, such as deals, battens, planks, boards, shingles, staves, and as wood-pulp, is the chief industry; with fish it constitutes the principal article of export. The imports include beef, pork, beer, ale, books, brass and copper manufactures, bread, biscuit, cider, coffee, copper, cordage, corn, grain, wheat-flour, Indian and other meal, cotton, linen, silk, and other manufactures, earthenware, fishing-tackle, glassware, gunpowder, haberdashery, hardware, hemp, hides, iron, leather, medicines, oakum, linseed, painters' colors, rice, soap, rum, spirits, sugar, tallow, tea, snuff. tobacco, wines, etc. The value of the imports from beyond the Dominion considerably exceeds a million sterling; more than half is from the United States, and more than one third from Great Britain. The exports are about equal to the imports. The province owns a relatively large amount of shipping, the greater part of it still consisting of wooden vessels.

Government.—The province is divided into 15 counties, and is administered by a lieutenant-governor, an executive council consisting of nine members, and a Legislative Assembly (1901) of 45 representatives. The upper house or legislative council was abolished in 1892. The province sends ten members to the senate, and fourteen to the house of commons of the Dominion parliament. The judicial department comprises a supreme court, with a chief and four puisne judges; a court of chancery, one of marriage and divorce, and one for the trial of offenses committed at sea; over these three courts the lieutenant-governor presides.

Population.—The population in 1901 amounted to 331,120. The majority of the inhabitants are British settlers and their descendants. There are a few inhabitants of French stock, who are principally settled on the Chaleur Bay; and there is a small number of Micmacs, Melicetes, and other Indians in the north part of the province. The capital is Fredericton. Saint John is the chief port and largest town.

Education and Religion.—Education is abundantly provided for, both high and elementary, and is under the supervision of a superintendent of education and an educational council. In 1901 there were 1,756 schools, with 1,886 teachers, attended by 61,565 pupils, and the amount expended for education was $600,340. In religion, Roman Catholics predominate, numbering in 1901, 125,698, while Baptists come next with 80,946, Anglicans numbering 41,767, Presbyterians 39,424, and Methodists 35,973. Each sect maintains its own university and seminaries.

History.—New Brunswick was first settled by the French in 1639, and it continued, along with Nova Scotia, to form part of Acadia or New France, till it fell into the hands of the British after the conquest of Quebec. The first British settlers in New Brunswick emigrated from Scotland to Miramichi in 1764. After the United States Revolutionary War it received a notable addition, in 1783, of 5,000 United Empire loyalists, and in 1784 was separated from Nova Scotia, and formed into a distinct province. In 1826 the standing timber in the district around Miramichi Bay took fire, and enveloped an area of 6,000 square miles in flames, consuming four thriving towns, many large vessels lying in Miramichi River, and destroying 500 human beings. In 1867 New Brunswick became a province of the Dominion of Canada.

Consult: Cooney, 'History of New Brunswick'; Gesner, 'New Brunswick'; Hannay, 'History of Acadia'; Bailey and Jack, 'Woods and Minerals of New Brunswick'; Perley, 'Early History of New Brunswick' (1891).

New Brunswick, brŭnz'wĭk, N. J., city, county-seat of Middlesex County; on the Raritan River, the Delaware and Raritan Canal; and on the Raritan R., and the Pennsylvania R.R.'s; about 25 miles north by east of Trenton, 30 miles west by south of New York, and 15 miles from the mouth of the river. It was settled in 1681, and until 1697 it was called "Prigmore's Swamp." The name was changed to "Inion's Ferry," and in 1714 it was again changed and called New Brunswick after the House of Brunswick. In 1730 it was granted a royal charter; in 1736 it was incorporated as a town, and in 1784 was chartered as a city. It was the scene of much of the trouble during the Revolutionary War; it was occupied by the British the winter of 1776–7.

It is a manufacturing city, and has considerable trade, as it has good shipping facilities by land and water. The chief manufacturing establishments are cigar factories which have about 1,400 employees; rubber works, 1,000 employees; wall-paper factory, 500 employees; and a large number of smaller works, all of which are prospering. It is the seat of Rutgers College (q.v.), the State Agricultural and Mechanical College (q.v.), and Saint Agnes' Academy. The Theological Seminary of the Dutch Reformed Church is connected with Rutgers. It has seven public schools, three parish schools, the Gardner A. Sage library which contains about 45,000 volumes, and the public library with about 18,000 volumes. The Saint Mary's Orphan Asylum and Home for the Aged is in charge of Sisters of Saint Francis.

The government is administered under the charter of 1863 and is vested in a mayor, who holds office two years, and a council of 13 members. The mayor appoints the board of health and the library trustees; the council elects the water commissioners; the board of education is elected by the people. The city owns and operates the waterworks. Pop. (1890) 18,603; (1900) 20,006.

New Caanan, kā'nan, Conn., town in Fairfield County; on the New York, New Haven & Hartford railroad; eight miles northeast of Stamford and six miles northwest of Norwalk. It is a beautiful residential town and a favorite summer resort for New York business men.

The surface is hilly, the altitude about 400 feet, and the climate cool in summer and temperate in winter. The hard well-kept roads extend into the country and to the beaches on the Sound. It has some manufacturing establishments, chief of which are clothing, boot and shoe factories, and cigar factories. It has a public library and reading room. Pop. (1890) 2,701; (1900) 2,968.

New Caledo'nia, or **Nouvelle Calédonie,** noo-vĕl kä-lā-dō-nē, an island and penal colony belonging to France, in the Pacific Ocean, lying between the parallel of 20° S. and the Tropic of Capricorn, about 700 miles east of Australia. Its length northwest to southeast is 250 miles, the breadth being about 35 miles. The area is 8,100 square miles. It is surrounded by coral reefs, at a distance of from five to 18 miles. It was discovered by Cook in his second voyage (1774). Two parallel ranges of mountains extend through the island, attaining in the north a height of 5,570 feet. The soil is fertile, and the island produces the bread-fruit tree, banana, sugarcane, arum, cocoa, and excellent timber. The climate is healthful. Iron, copper, cobalt, nickel, silver, mercury, antimony, and gold have been discovered in recent years, and the nickel mines are now an important source of this metal. Coal is also found in abundance. The animals are very few, mammals and reptiles being specially deficient. The Melanesian natives, known as Kanakas, were formerly given to cannibalism. They are mainly Papuan in character, and are grouped in tribes, each with its own chief. In the irrigation and tillage of the soil they show no small skill. The Catholic mission, which has numerous stations, has made many converts. The aborigines sometimes engage as laborers under the Europeans, and natives of the neighboring islands are also introduced for the sake of their labor. The chief crops of the island are maize and taro; and among the other objects of cultivation are rice, wheat, sugarcane, coffee, cotton, cocoanuts, etc. The imports, largely for the convict stations, are wines and spirits, flour, vegetables, etc.; and the exports include nickel, preserved meat, chrome and other ores, etc. New Caledonia was taken possession of by the French on 24 Sept. 1853, and a small colony was formed there. During the time of the Second Empire it was employed as a place of banishment for criminals, a purpose which it still serves. The dependencies of the island are the Isle of Pines, the Loyalty Islands, the Huon Islands, the Chesterfield Islands, and the Wallis Archipelago. The whole of this territory is under a governor, advised by a council-general, and is divided into five arrondissements, of which four are ruled by administrators, whilst the fifth, Nouméa, is directly under the governor. The government of the island is essentially military, and the frequent escape of convicts (sometimes unwelcome visitors to Australia) has rendered the authorities very strict. The convicts are grouped in five classes, of which two have contributed much to the improvement of the colony by the construction of roads, etc., whilst a third is virtually free. A railway now connects Nouméa with Kanala. The capital, and only important town, is Nouméa, formerly called Port-de-France, with a pop. (1901) 6,968. It lies in a small mountainous peninsula on an excellent bay of the same name. In 1901 the total population was 51,415, of whom 12,253 were European civilians, 10,056 undergoing punishment, and 29,106 natives. Consult Griffith, 'In an Unknown Prison Land' (1901).

New Caledonia, North America, a former name for a region west of the Rocky Mountains, 500 miles long from north to south, and 400 from east to west, now included in British Columbia.

New Castile, kăs-tēl', Spain, an ancient province, corresponding to the old kingdom of Toledo, and now forming the provinces of Madrid, Ciudad-Real, Cuenca, Guadalajara, and Toledo, occupying nearly the centre of the peninsula; it had an area of 28,010 square miles, and the population of the region in 1897 was 1,853,314. With the province of Old Castile which bounded it on the north, and is now divided into the provinces Avila, Burgos, Logrono, Palencia, Santander, Segovia, Soria, and Valladolid, area, 25,490 square miles, pop. (1897) 1,764,440. New Castile formed the kingdom of Castile which was instrumental in expelling the Moors from Spain (q.v.).

New Church. See SWEDENBORGIANS.

New-chwang, nū-chwäng'. See NIU-CHUANG.

New Col'lege, Oxford, England, was founded in 1379 by William of Wykeham, bishop of Winchester and lord-chancellor of England, as the College of Saint Mary of Winchester, the scholars to be recruited from the most promising pupils of the great public school of Winchester (q.v.). Its original establishment comprised a warden, 70 fellows and scholars, 10 chaplains, three clerks, and 16 choristers; its modern establishment comprises a warden, 22 fellows, three chaplains, 40 scholars, a choir, and an average of nearly 300 graduates. Forty church presentations are within its gifts. The college buildings are among the finest in Oxford, and originated the style of English college architecture; the chief features are the hall, the chapel, and the gardens. Among celebrities associated with the college are Vitelli, Grocyn, Archbishop Chichele, Bishops Waynflete, Lowth, Ken, and Sydney Smith.

New Comerstown, kŭm'ĕrz-town, Ohio, city, in Tuscarawas County; on the Tuscarawas River, and on the Pennsylvania and the Pittsburg, C., C. & St. L. R.R.'s; about 80 miles east by north of Columbus. It is in a fertile agricultural region, near bituminous and clay deposits. The chief manufactures are lumber and planing mill products, cigars, brick, and dairy products. Pop. (1890) 1,251; (1900) 2,659.

New Connection of General Baptists, an orthodox body protesting against the growing Arianism and Socinianism of the English Baptist Church dating from 1770 and led by Dan Taylor (1738–1816), a Cornish miner.

New Connection Methodists, the first secession from the English Wesleyans, dating from 1797. The New Connection comprised the followers of Alexander Kilham (hence sometimes called KILHAMITES), who in 1795 published 'The Progress of Liberty,' a criticism of the lax church discipline of the day, for which he was expelled from the Conference a year later. In 1797 three other ministers joined him.

The church government of the New Connection gives laymen equal authority with the clergy in Conference. With but a few congregations in Ireland and in Canada the body is not growing and in 1890 numbered about 35,000 members.

New Creek (Keyser), **Engagements at.** While Gen. J. E. Johnston was at Winchester, Va., 14 June 1861, he heard that Col. Lew Wallace, with the 11th Indiana regiment, had marched from Cumberland, Md., and driven a Confederate force from Romney. Believing it to be the advance of McClellan's column from West Virginia, Johnston ordered Col. A. P. Hill, with three regiments, to march on Romney, 45 miles west, drive out Wallace, and destroy the bridges on the Baltimore & Ohio Railroad west of Cumberland. Hill reached Romney, but Wallace had fallen back to Cumberland. At night of the 18th Hill sent Col. Vaughn, with four companies of infantry, to destroy the bridge of the Baltimore & Ohio Railroad over New Creek, guarded by about 200 local militia and two guns. Vaughn crossed the north branch of the Potomac, beyond which the Union troops had taken position, and put them to flight, captured the two guns and a set of colors, burned the bridge over the mouth of New Creek, and then pushed on to Piedmont, five miles westward, destroyed parts of the railroad and cut the telegraph wires, and then returned to Winchester. Later the position at New Creek was fortified and garrisoned to protect the railroad bridge. On 4 Aug. 1864 it was held by Col. Robert Stevenson of the 154th regiment Ohio National Guard with his regiment, small detachments of three other regiments, and eight guns, in all about 1,500 men. During the day Stevenson was attacked by Gen. John McCausland, who returning from his raid on Chambersburg, had approached by way of Romney. After a severe fight of several hours McCausland withdrew toward Moorefield, leaving several dead and severely wounded on the field. The Union loss was 8 killed, 29 wounded and missing. On 27 Nov. 1864 New Creek was held by Col. Latham, 5th West Virginia cavalry, with about 700 dismounted cavalry, four heavy guns, and three field pieces. On the morning of the 27th Gen. Rosser with two brigades of cavalry, his own and Payne's, crossed Great North Mountain into Hardy County, surprised and captured Latham's pickets, charged over his works, and captured his artillery and most of his command with but slight resistance. The prisoners taken numbered about 500, and with them their arms and some colors. Four of the seven guns, being heavy pieces, were spiked and left, the carriages being burned. All the government buildings, containing a large amount of ordnance, quartermaster and commissary stores, and 200 wagons, were burned, and Rosser marched away with his prisoners, three guns, about 250 horses, also several hundred head of cattle and a large number of sheep collected from the farms of Hardy and Hampshire counties.

E. A. CARMAN.

New Cum'berland, W. Va., town, county-seat of Hancock County; on the Ohio River, and the Pittsburg, C., C. & St. L. railroad; about 35 miles north of Wheeling. In the vicinity are coal mines and valuable clay beds. The chief manufactures are sewer pipe, tile, a semi-porcelain pottery, fire and paving brick, foundry products, and machinery. It has large mills where the fire clay, for use in the iron works, is pulverized. It has an extensive trade in coal and clay products. Pop. (1890) 2,305; (1900) 2,198.

New Decatur, dē-kā'tėr, Ala., city, in Morgan County; near the Tennessee River, and on the Memphis & C., and the Louisville & N. R.R.'s; about two miles south of Decatur and 85 miles north by west of Birmingham. The first settlement was made in 1887, and in 1889 it was incorporated. It is in an agricultural, lumbering, and manufacturing section of the State. Its industrial interests are connected with the manufacturing and shipping of iron products, lumbering and farm products. It has a good trade in wool. Pop. (1890) 3,565; (1900) 4,457.

New Eng'land, a collective term applied to the northeastern portion of the United States, comprising the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. It extends from lat. 41° to 48° N., and from lon. 67° to 74° W., with an aggregate area of 65,000 square miles. It has a coast line of about 700 miles, without allowing for the smaller inlets, and constitutes a large part of the great peninsula which, including Nova Scotia, New Brunswick, and parts of Lower Canada, is formed by the Atlantic Ocean, the St. Lawrence, and the connected waters of Lakes Champlain and George and the river Hudson. It was originally granted for colonization by James I. in 1606 to the Plymouth company under the name of North Virginia, and received its present name from Capt. John Smith, who in 1614 explored and made a map of the coast. For the details of the geography and history of New England, see the States respectively of which it is composed. Consult Palfrey, 'History of New England.'

New Eng'land, A Compendious History of, by John Gorham Palfrey (q.v.). It covers the time from the first discovery of New England by Europeans down to the first general Congress of the Anglo-American colonies in 1765, with a supplementary chapter giving a summary of the events of the last ten years of colonial dependence, and was published 1865–73.

New England Emigrant Company, The, in American history, a corporation organized at Boston in 1855 to control emigration to the Territory of Kansas in the interest of the anti-slavery party. The Emigrant Company aided largely in making Kansas a free State.

New England Historic and Genealogical Society, The, an association organized in Boston, Mass., in 1845 for historical research and the preserving of early New England records. A quarterly magazine, 'The New England Historical and Genealogical Register,' was begun in 1847 and the society also publishes the 'Bibliopolist' for circulation among its members. The library of the society contained in 1903 over 32,000 volumes.

New England Order of Protection, an American fraternal and beneficial Society organized in 1887. In 1903 it had 6 grand lodges, 335 sub lodges and 31,854 members. In 1902 it disbursed $485,000 in benefits, and over $3,000,000 since its organization.

New England Primer, a famous educational work, compiled by one Benjamin Harris, an English versifier and printer, who established a nondescript shop in Boston during the reign of James II. He first published 'The Protestant Tutor,' and before 1690 the 'New England Primer' as an abridgment of the earlier work. It is thought that in the 18th century about 2,000,000 copies were sold, yet of these less than 50 are known to be extant. These surviving copies represent about 40 editions. Only a small portion of the supposed 1st edition is in existence, this so-called 'Bradford Fragment' having been discovered as waste in the binding of a later work. The contents of the 'Primer' was variously altered in accommodation to religious and political changes. The alphabet rimes, with wood-cuts crude as themselves, are probably the best-known feature. One of the most curious of these illustrations shows Job liberally covered with spots. The shorter Westminster catechism is also included. P. L. Ford (q.v.) did much to clear up the subject of the 'Primer' by his historical and bibliographical study, 'The New England Primer: A History of its Origin and Development, with a Reprint of the Unique Copy of the Earliest Known Edition' (1897).

New England Shilling, the name given to the first American colonial coins issued in 1652. They were of the value of "12d, 6d and 3d peeces," stamped N E on the face and XII, VI or III on the reverse to denote the value. See NUMISMATICS.

New England Theology, a Calvinistic school of theology, originated in New England by Jonathan Edwards (see EDWARDS, JONATHAN). This school was controversially opposed to Arminianism (q.v.). A new element was introduced into the theological atmosphere of New England by the preaching of Universalism (q.v.) by John Murray 1770. The controversies of the early 19th century resulted in the crystallization of New England Theology into a complete system, comprising the tenets, that sin is voluntary; that depravity is inherited from Adam; that repentance or turning to God can only result from preventing grace; that man has complete freedom of will; that holiness consists in unselfish love; that certain persons are predestined to receive the grace of God which leads to repentance. Modern philosophy and criticism have dissolved the dogmatism of this theology which is no longer taught in an unmodified form in Congregational seminaries. Consult: Walker, 'History of the Congregational Churches in the United States' (1894); Boardman, 'New England Theology' (1899).

New Essays: Observations, Divine and Moral, collected out of the Holy Scriptures, Ancient and Modern Writers, both Divine and Human; as also out of the Great Volume of Men's Manners; tending to the furtherance of Knowledge and Virtue. By John Robinson (q.v.) (1624). A volume of 62 essays, on the plan of Bacon's, but at greater length, and in ethical, religious, and human interest more like Emerson's 'Essays' in our own time: the work of an English clergyman and scholar, in exile at Leyden in Holland, under whose ministry and through whose counsel the Pilgrim Fathers developed religious liberalism and executed the earliest planting of New England.

New Forest, England, a public pleasure ground in the southwest of Hampshire, bordering on the Solent and English Channel, and bounded northeast by Southampton Water, and west by the river Avon. It measures 14 by 16 miles, is about 60 miles in circuit, and has an extreme area of 144 square miles. Its name dates from 1079 when William the Conqueror made a "mickle deer-frith," in so doing destroying several hamlets. This afforestation, enforced by the savage "Forest Laws" was regarded as an act of the greatest cruelty, and the violent deaths in the forest of his sons Richard and William Rufus, were looked upon as special judgments. Oak and beech are the principal trees; the deer were removed in 1851. The forest is under the supervision of the Court of Verderers since 1877; it gives its name to a county parliamentary division. There are several villages within its limits, Lyndhurst being the forest capital.

New France, or **La Nouvelle France,** lä noo-vĕl fräṅs, the original name given to Canada (q.v.) by the earliest settlers, who were Frenchmen.

New Glasgow, glăs'gō or -kō, Canada, town in Pictou County in Nova Scotia; on the East River, and on the Nova Scotia railroad and a branch line, eight miles long, which connects it with Pictou Landing on Northumberland Strait. In the vicinity are coal fields and large deposits of iron ore. The chief industries which contribute to the prosperity of the town are iron and coal mining, manufacturing implements for mining and manufacturing glass and leather. It has large ship-building yards and considerable trade in coal, iron ore, and manufactured articles. Pop. (1891) 3,776; (1901) 4,447.

New Granada, grạ-nä'dạ, the name by which the republic now called Colombia (q.v.), was known for many years after its settlement by people from Granada, Spain.

New Guinea, gĭn'ĭ, or **Papua,** păp'oo-ä or pä'poo-ä, Australasia, a large island of the Melanesian region, the western and larger portion of which belongs to the Netherlands, while the eastern portion is divided into northern and southern sections, belonging respectively to Germany and Great Britain. The island, which after Australia and Greenland ranks third among the largest islands of the world, lies on the southwestern side of the Pacific Ocean, between lat. 0° 19′ and 10° 42′ S., and lon. 130° 57′ and 150° 52′ E. Its length is about 1,490 miles; maximum breadth, 410 miles; estimated area, over 312,000 square miles. It is separated from Australia (Queensland) on the south by Torres Strait, from the northern territory of South Australia by the Arafura Sea, and from the Moluccas on the west by Gilolo Passage. The island has a somewhat irregular form, but it may be described as consisting of a broad central portion from which proceed two narrower peninsulas, one in the northwest and the other in the southeast. The coasts are mostly lofty, but in the neighborhood of Torres Strait and to the west the shore presents the appearance of a marshy flat, covered with dense forests. The outline is broken by many indentations,

among the chief being the Gulf of Papua and M'Cluer Inlet on the southern side, and Great Geelvink Bay, Astrolabe Bay, and Huon Gulf on the northern side. Many islands, large and small, lie off the coast, chief of which are those of the Bismarck Archipelago (q.v.) belonging to Germany off Kaiser Wilhelm Land, the northeastern section of New Guinea.

In the southeast of the island the mountain ranges rise in Owen Stanley to a height of 13,205 feet; farther west and near the north coast Mount Schopenhauer reaches 20,000 feet; in the eastern continuation of the Charles Louis Range in Dutch New Guinea, as yet unexplored, there are still loftier mountains, covered with perpetual snow, and volcanoes. The chief rivers are the Fly, in British territory, with its tributary the Strickland; the Kaiserin Augusta, in German territory; and the Amberno, in Dutch territory, with a large delta. New Guinea has few indigenous mammals, and all these, with the exception of a species of pig and some mice, are marsupials and monotremes. It abounds in birds, among which are immense flocks of parrots, pigeons, and kingfishers, and the celebrated birds of paradise. There are also several remarkable species of bower-birds, belonging to the genus *Amblyornis*. The forests abound in enormous trees, including the camphor-tree; and bananas, cocoanuts, sago, sugarcanes, rice, maize, and yams, are cultivated by the natives. On the west coast there are numerous Malay settlements, but the bulk of the inhabitants is composed of Papuans, a race resembling the negroes of Guinea. They are divided into numerous tribes chiefly in a neolithic stage of civilization, some of whom are of a friendly disposition, while others are fierce and untractable, but gradually improving under Europeanizing and missionary influence.

The discovery of New Guinea is said to have been made by Abreu in 1511, but the first navigator who is known to have visited the island was another Portuguese, Jorge de Meneses, who touched on it in 1526. The present name was given to the island by the Spaniard Ynigo Ortiz de Retes, who sailed along its north coast in 1546. From the beginning of the 17th century much exploring work was done by the Dutch, especially along the west and south coasts of what is now Dutch New Guinea. Dampier in 1700 added to our knowledge of the south coast, and discovered Dampier Strait. In 1827 the Dutch formed a settlement at Triton Bay, but they soon abandoned it. The southeast coast was surveyed between 1845 and 1850 by Captain Owen Stanley, and 1873 Captain Moresby ascertained the exact form of the southeastern extremity. The naturalists were the first to make incursions into its interior, and among these Dr. A. R. Wallace, who visited it in 1858, was the pioneer. The missionaries came next, and mission stations formed by Germans are maintained on the northeast coast, and by the London Missionary Society at various points on the southeast coast. Germany, and the Australian colonies also, began to take an interest in New Guinea, and the latter urged the British Government to annex the east part of the island, the west portion having long been recognized as Dutch. The delimitation and division of the island between Great Britain, Germany and Holland was settled in 1885. That part of the island lying west of the 141st meridian was assigned to Holland, and comprises 151,789 square miles; the north part of the rest of the island is assigned to Germany, and the south to Great Britain. The Germany territory, called Kaiser Wilhelm's Land, contains about 70,000 square miles; the English territory, 90,540 square miles.

The government of the British portion is in the hands of an administrator appointed by the crown, assisted by an executive and a legislative council. New South Wales, Victoria, and Queensland each contribute to the expense of the government. Land cannot be purchased except from the administrator. The deportation of the natives is forbidden, as is also the sale to them of firearms, intoxicating spirits, or opium. The official centre is Port Moresby. The islands of Torres Strait, which are the seat of a valuable pearl-shell and trepang fishery, and which practically command the strait, have all been annexed to Queensland. A German chartered company whose object is to develop the resources of the country has stations in German New Guinea, where also the sale of firearms, gunpowder, and spirits is forbidden. The Dutch have done little or nothing for their portion of the island. The population of the Dutch portion is estimated at 200,000; of the German, 110,000; of the British, 350,000; total, 560,000. Consult: Chalmers, 'Pioneer Life and Work in New Guinea' (1895); Cooke, 'Australian Defences and New Guinea' (1887); Haddon, 'Decorative Art of British New Guinea' (1894); MacGregor, 'British New Guinea' (1897); Romilly, 'The Western Pacific and New Guinea' (1887); Webster, 'Through New Guinea' (1889).

New Hampshire, hămp'shĭr, one of the New England States, is named from Hampshire in England, the title being first applied in 1629. It is also locally and popularly known as the «Granite State.»

Physical Conditions.— The most northerly of the 13 original colonies, New Hampshire lies 70° 37′ and 72° 37′ longitude west from Greenwich, and between 42° 40′ and 45° 18′ 23″ north latitude. In general outline its outline is that of a scalene, almost a right-angled triangle, with a north and south perpendicular of 180 miles. The extreme width near the southern boundary is 100 miles. The State is bounded on the north by the Province of Quebec, on the east by the State of Maine, on the southeast by the Atlantic Ocean and Essex County, Mass., on the south by the State of Massachusetts, on the west and northwest chiefly by the State of Vermont and partly by the Province of Quebec. Within these bounds is included an area of 9,336 square miles of greatly diversified country, comprising sea coast, lakes, rivers, mountain ranges, forests and tillable land. The surface contour is in general rugged and picturesque. By reason of latitude, ocean proximity, high mountains and narrow valleys the climate conditions present great variety. The mean average temperature of the northern portion for the year is 41; for the winter 17; for the summer 65; of the southern part the mean average for the year is 45; for the winter 23; for the summer 66.5. The average precipitation is nearly 40 inches per year, quite evenly distributed both as to area and period. There are five distinct water-shed areas, drained by the Connecticut, Merrimac, Androscoggin,

Saco and Piscataqua rivers and their numerous tributaries. These streams contribute materially to the economic resources of the State through their abundant water power, and to the fertility of their valleys. The mountain district comprises 1,270 square miles, the culminating point of which is Mount Washington, 6,270 feet high. This area is divided into two nearly equal divisions by the deep and continuous valleys of the Saco and the Ammonoosuc, and these in turn are subdivided into several smaller groups. Winnepesaukee, situated in Belknap and Carroll counties, is the largest lake, having an area of 70 square miles, exclusive of islands, of which it contains 264. Other important lakes in order of their size are Umbagog, 18 square miles; Squam, 15.6, and Sunapee, 11.2.

Settlement.— The first description of any of the region now included within the State of New Hampshire was given by Captain John Smith, who skirted the New England coast in 1614, from Penobscot Bay to Cape Cod, and discovered the Piscataqua River and the adjacent harbor, although the coast is said to have been visited in 1603 by Martin Pring. In 1623 the first settlement on the mainland was effected. That of Thomson at Odiorne's Point and that of the Hiltons at Dover Point have occasioned some controversy among the local historians on questions of priority. Several other settlements followed in the succeeding 20 years. A movement up the Merrimac Valley began and was continued in the later colonial period in accordance with the jurisdictional claims of Massachusetts, which at times were asserted, theoretically, to an east and west boundary three miles north of a point now and since 1652 marked by Endicott Rock in Lake Winnepesaukee at the Weirs. The Connecticut Valley was an attractive region and settlers worked their way northward in the face of the torch and tomahawk, from Fort Dummer to "No. 4," in the intervals between the Indian wars. A much later influx of settlers from southern New Hampshire, Massachusetts, Rhode Island and Connecticut should also be noted. Practically the whole of the northwestern portion of the State had remained ungranted and unsettled until the English conquest of Canada in 1760. But as soon as peace assured tranquillity to settlers, a tide of immigration at once set in along the course of the Connecticut and its tributaries, and in the years from 1749 to 1764 Gov. Wentworth granted no less than 129 townships and six individual grants west of the Connecticut and 50 or more on the east side. About the same time still another, but less important movement, was going on in the valley of the Saco.

Political Divisions.— For purposes of administration the State is divided into 10 counties, with county-seats and population as follows:

Counties	Pop. 1900	County-seat	Pop. 1900
Belknap	19,526	Laconia	8,042
Carroll	16,895	Ossipee	1,479
Cheshire	31,321	Keene	9,165
Coös	29,468	Colebrook	1,876
		Lancaster	3,190
Grafton	40,844	Haverhill	3,414
		Plymouth	1,972
		Lebanon	4,965
Hillsborough	112,640	Manchester	56,987
		Nashua	23,898
Merrimack	52,430	Concord	19,632
Rockingham	51,118	Exeter	4,922
		Portsmouth	10,637
Strafford	39,337	Dover	13,207
Sullivan	18,009	Newport	3,126

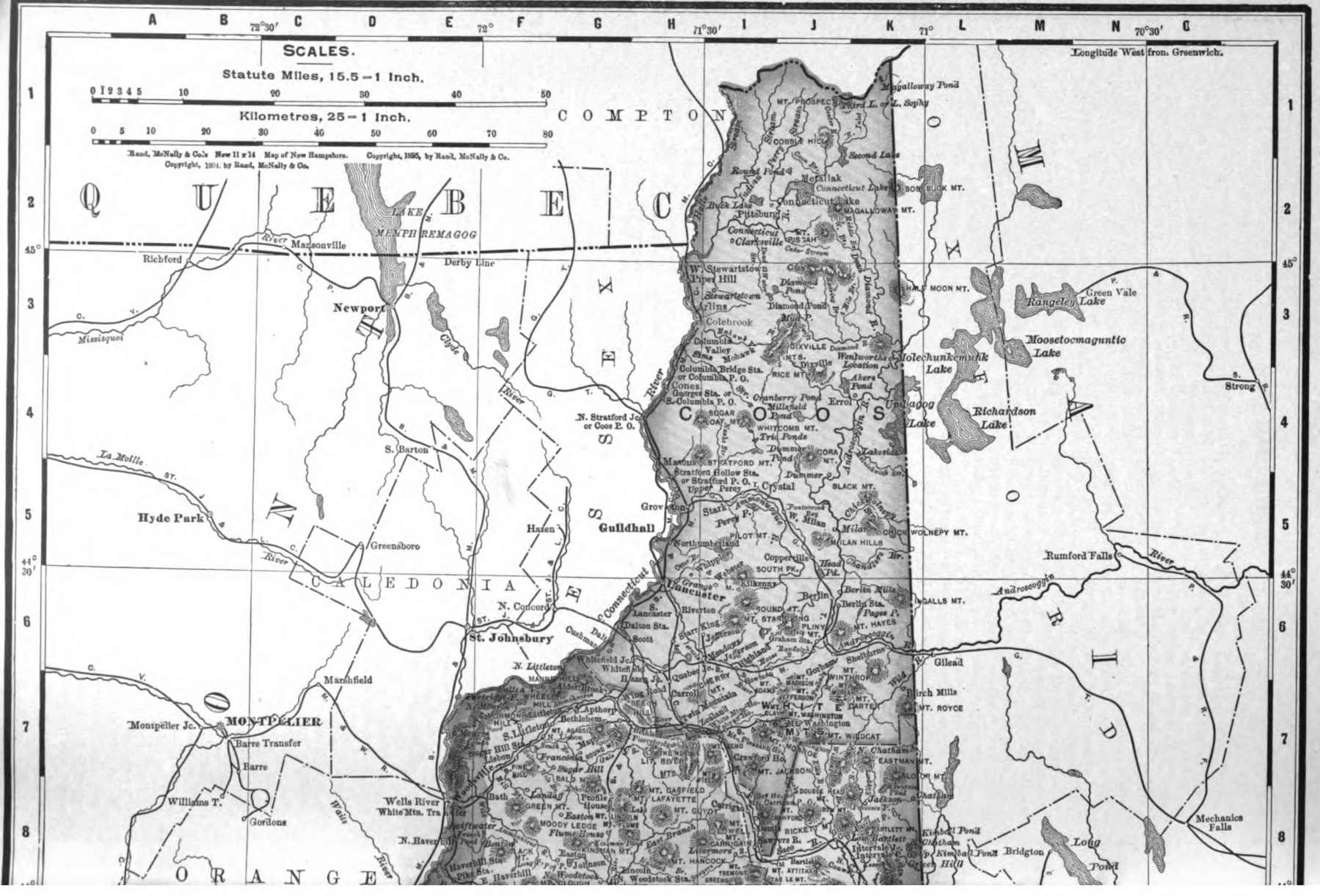
The United States Courts.— The Federal circuit and districts courts are held at Portsmouth, Concord and Littleton (population 4,066). The district judge resides at Littleton and the residence and office of the clerk of these courts is at Concord.

Population.— In 1900 New Hampshire stood 36th in respect to population, having a total of 411,588. Of these 323,481 were native born, and 88,107 foreign born. There were 12,924 aliens. The density is 45.7 to the square mile. There are 11 cities with population as follows: Berlin 8,886, Concord 19,632, Dover 13,209, Franklin 5,846, Keene 9,165, Laconia 8,042, Manchester 56,987, Nashua 23,898, Portsmouth 10,637, Rochester 8,466, Somersworth 7,023.

The suffrage is accorded to males 21 years of age, except paupers, persons voluntarily excused from taxation, and unnaturalized aliens. An educational test was imposed by the last amendment of the constitution. Women may vote in school meetings. The State election is biennial, on the even year, and occurs in November. The governor, council of five members, and the legislature, which consists of 24 senators and (1903) 393 representatives, assume office on the first Wednesday in January of the odd years. The number of senators is fixed at 24, while the membership of the house depends upon population. Concord became the seat of government in 1808, and the state house was erected there in 1819. The ancient New England town system still prevails except in the cities, and is regarded as preferable to the city form of government in municipalities even of very large population.

The Judiciary.— The courts of the State are a supreme court, consisting of a chief justice and four associates, having jurisdiction over issues of law; a superior court, consisting of a chief justice and four associates, having jurisdiction for the trial of issues of fact, the judges of this court attending the trial terms in a circuit of the shire towns which includes the entire State; the 10 courts of probate organized with a judge and register for each county; the municipal courts (one in each of the 11 cities and 33 towns), having limited and preliminary criminal jurisdiction and jurisdiction of civil causes in which not more than $100.00 is claimed and the title of real estate is not in issue; justices of the peace, having preliminary and limited criminal jurisdiction in towns and places where no municipal court is established and jurisdiction in civil causes to the amount of $13.33, provided the title to real estate is not involved. The board of railroad commissioners, the board of license commissioners and the board of equalization of taxes also have judicial functions. Admission to the bar requires three years of actual and certified study, followed by examination, both oral and written, before a standing board of examiners appointed by the court. Certificates of graduation from law schools are not accepted in lieu of actual qualification, ascertained in the manner above stated.

County Government.— A board of three commissioners elected by popular vote are the executive officers of each county. These officials also have certain judicial functions relative to the laying of highways, the settlement of paupers and issues of fact referred to them for trial by the superior court. The members of the legis-


SCALES.
Statute Miles, 15.5 — 1 Inch.
0 1 2 3 4 5 10 20 30 40 50
Kilometres, 25 — 1 Inch.
0 5 10 20 30 40 50 60 70 80
Rand, McNally & Co.'s New 11 x 14 Map of New Hampshire.
Copyright, 1901, by Rand, McNally & Co.
Copyright, 1895, by Rand, McNally & Co.
Longitude West from Greenwich.
72°30′ 72° 71°30′ 71° 70°30′
45° 44° 30′
COMPTON
QUEBEC
ESSEX
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Round Pond
Connecticut Lake
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Pittsburg
Connecticut Lake
Clarksville
Stewartstown
Colebrook
Columbia
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Cones Corner Sta. or S. Columbia P. O.
N. Stratford Jc. or Coos P. O.
Stratford Hollow Sta. or Stratford P. O.
Upper Perey
Percy
Groveton
Guildhall
Northumberland
Copperfield
Lancaster
Riverton
S. Lancaster
Dalton Sta.
Scott
N. Concord
St. Johnsbury
N. Littleton
Whitefield Jc.
Whitefield
Hazen Jc.
Hazen
S. Barton
Newport
Derby Line
Richford
Marsonville
Missisquoi
La Motte
Hyde Park
Greensboro
Marshfield
Montpelier Jc.
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Pike Sta.
E. Haverhill
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Lisbon
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Flume House
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Mt. Attitash
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Mt. Prospect
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Rice Mt.
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Sugar Loaf Mt.
Whitcomb Mt.
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Dummer Pond
Stratford Mt.
Cora Mt.
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Pilot Mt.
Milan Hills
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Pilot Mt.
Round Mt.
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Pliny
Berlin
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Berlin Sta.
Pages P.
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Birch Mills
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Mt. Clay
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Mt. Pierce
Mt. Eisenhower
Mt. Carter
Mt. Wildcat
Mt. Jackson
Mt. Chatham
Eastman Mt.
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Jackson
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Kimball Pond
Bridgton
Green Hill
Long Pond
Mechanics Falls
Androscoggin R.
Rumford Falls
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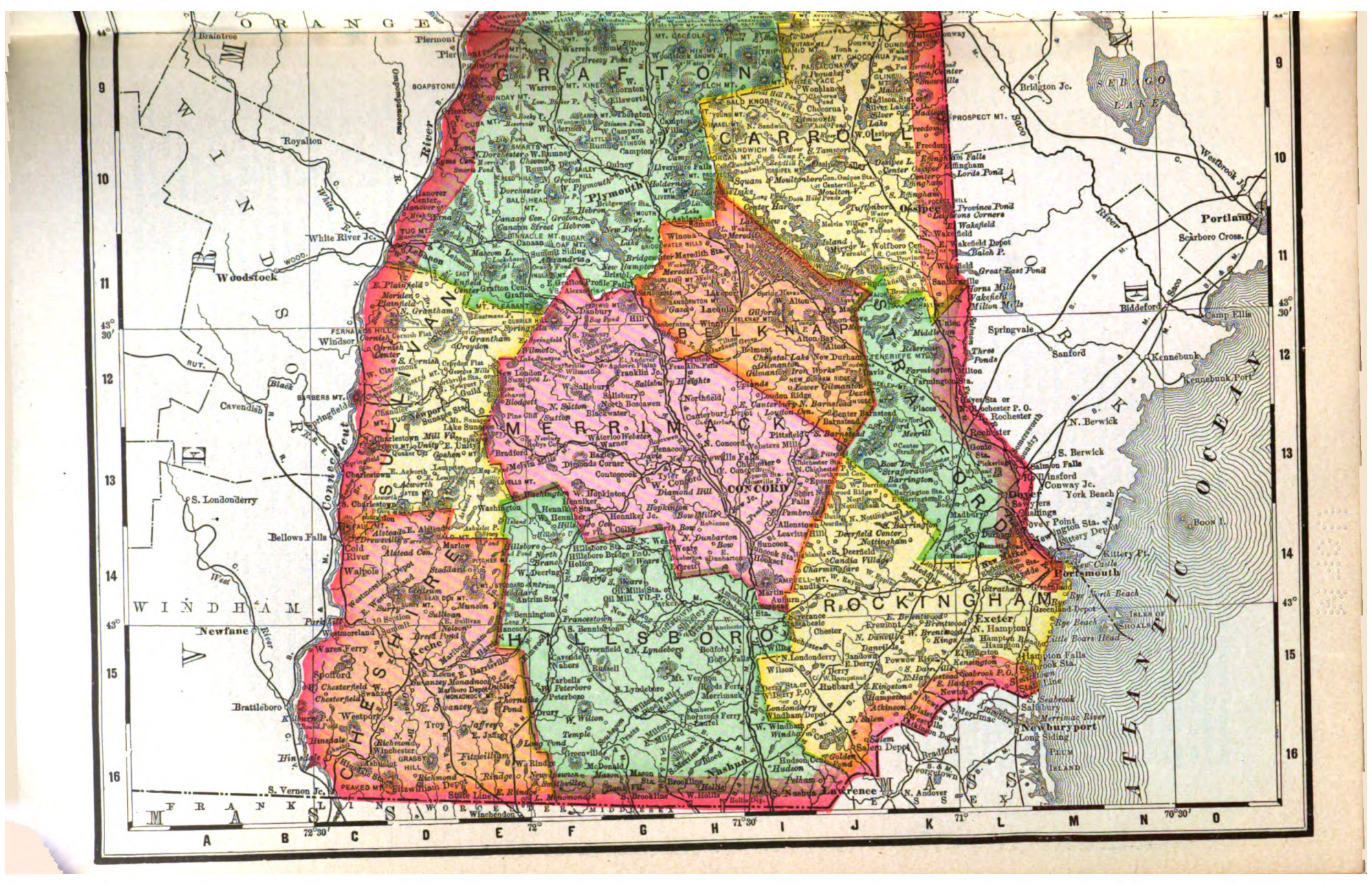
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Ossipee
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Freedom
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Conway
North Conway
Jackson
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Intervale
Bartlett
Crawford Notch
Bethlehem
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Bath
Piermont
Warren
Wentworth
Rumney
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Sandwich
Tamworth
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Fryeburg
Lovell
Sebago Lake
Bridgton Jc.
Portland
Scarboro Cross.
Biddeford
Camp Ellis
Springvale
Sanford
Kennebunk
Kennebunk Port
N. Berwick
S. Berwick
Salmon Falls
Rollinsford
Conway Jc.
York Beach
Dover
Somersworth
Rochester
Farmington
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lature for each county, assembled in convention, are a legislative body for the county. They vote taxes for county purposes and direct as to their expenditure.

Agriculture.— About 62.6 per cent. of the land area of New Hampshire, or 5,640 square miles, is devoted to agriculture. In the early life of the State this industry, as is usual in most new communities, largely predominated over all others, and although it now occupies a second place, it is still of great importance. The soil along the sea-coast and in the river valleys is fertile, while the upland farms require careful treatment to render them fairly productive. The number of farms has fluctuated only slightly from decade to decade since 1860, and is now 29,324, only 95 more than at the former date. These farms contain 3,609,864 acres, of which 1,076,879 are improved, and 2,532,985 are unimproved. The percentage of improved land has decreased from 64.4 in 1850 to 29.8 in 1900. This significant fact denotes a readjustment of methods to meet the competition of the West. Cereals and crops requiring large areas have given place to the more intensive forms, such as dairying, fruit growing, market gardening, poultry raising, etc. Since 1850 the value of farm property has increased $19,410,073, being now estimated at $85,842,096. A board of agriculture, established in 1820, a board of cattle commissioners, established in 1891, and an extensive and an influential State section of the Patrons of Husbandry, introduced in 1873, are directing, co-operating and stimulating forces in the field of agriculture. The recently organized Board of Commissioners for the examination of veterinary surgeons, as well as efficient laws governing the inspection of cattle, of milk and other food products, and the prevention of the adulteration and the commercial imposition of fraudulent and deleterious food stuffs, are in the domain of official activity endorsed or sustained by the State in the interest both of improved agriculture and the conservation of the public health. These agencies are partly under the direction of the Board of Agriculture, partly subordinate to the State Board of Health, and partly in the exercise of functions under organizations distinct from either of those boards.

Manufactures.— The excellent water-power privileges upon the numerous streams of the State early become a controlling factor in the permanent location and development of manufacturing industries. Since 1850 the progress has been striking, especially compared with the slow growth of population, and during that period manufacturing has supplanted agriculture as the leading industry of the State. While the increase of population since 1850 has been but 29.4 per cent, that of the average number of wage earners has been 159.9 per cent. In 1850 the latter constituted only 8.5 per cent of the population, while in 1900 they had increased to 21.1 per cent. The manufacture of boots and shoes has assumed strikingly large proportions, and now, with a total output of $23,405,558, occupies the first place, which for a long time was held by the manufacture of cotton goods. Although the latter industry has now taken second place, its growth has been steady. The Amoskeag corporation continues to hold its rank as the largest single establishment for the manufacture of cotton goods in the world. In 1900 the total production was $22,998,249. The woolen industry ranks third, its history extending over a period from 1801 when James Sanderson built, at Ipswich, the first carding mill in the State. The total output of this industry was valued at $10,381,056 in 1900. Lumber and timber products, the fourth in rank, date their history from the erection by Mason's colonists of the first saw-mill in New England near Portsmouth in 1635. The lumber mills in Berlin and Lincoln have been developed and improved in recent years until they are among the most extensive and best equipped in the United States. The total production in 1900 was $9,218,310. Among other important industries are the manufacture of wood-pulp, hosiery and knit goods, and foundry and machine-shop products. In 1900 there were 5,267 manufacturing establishments with a total capital of $101,370,866, and a production of $188,985,902. They were paying $27,654,404 to 70,786 wage earners. Important brewing and distilling establishments are located at Portsmouth and Manchester.

Finance.— The report of the treasurer for the fiscal year ending 31 May 1903 showed a total of receipts of $876,333.53; disbursements of $766,712.13; a balance of $109,621.40; and an indebtedness of $646,810.96. The assessed valuation of taxable property was $216,837,497.00, and the rate $1.98 per $100.00.

Banks.— In 1792 the first bank was established at Portsmouth. On 30 June 1903 there were 56 national banks, 53 savings banks, 8 banking and trust companies, two State banks, and 16 building and loan associations. The savings banks and savings departments of the trust and banking companies that were in active operation showed that their aggregate resources on 30 June 1903 were $69,102,213.21. Due depositors, $63,919,183.10. Guaranty fund and interest, $5,300,036.47. The average rate of interest was about 3¼ per cent. The number of depositors was 155,309, an increase during the year of 7,381. The supervision of State banks is committed to a board of three commissioners. This office was established in 1837.

Insurance.— A total of 108 fire insurance companies were doing business in the State 1 April 1903. Of these 30 were mutual; 78 were stock companies of which 30 were domestic, and 48 foreign. There were also 26 life insurance companies, 7 fidelity and surety companies, 18 casualty companies, 6 assessment casualty companies and 29 fraternal associations. The total of premiums received by all companies was $3,965,925.53, and the total of losses paid was $2,126,498.93. It was in New Hampshire that the valued policy law first became established after a notable contest with the insurance companies in 1885. A single State commissioner supervises all branches of insurance. The office was created in 1851.

Railroads.— The first railroad was chartered in 1835, since which time the mileage has increased to 1,189.34. The railroads of the State are now consolidated under the systems of the Boston & Maine, which operates 1,037.15 miles; the Maine Central, 100.13; the Grand Trunk, 52.06. There has been but one accident in New Hampshire since 1883 in which a passenger has been seriously injured, while being transported upon a steam passenger train. In 1900 there were 10 street railways, with a mileage of 138, which had issued stock to the amount of $1,478,000.00; and bonds to the amount of $1,486,744.76. A

railroad commission of three members has been appointive since 1883, but the office as first established in 1844 was elective and continued to be for 40 years. Under later laws the functions of the commission have become greatly extended.

Accommodation for Tourists.— The State is becoming the home and a place of sojourn of thousands of those who are seeking recreation and location in a region of the most healthful climate and the most attractive ocean and mountain scenery on the western side of the national domain. Recent statistics of this business exhibit an investment of $10,442,352 in the State. The help employed in 1899 was 12,354, with wages of $539,901; 204 towns were entertaining summer tourists; more than 20,000 of these people occupied cottages in 1899. They were also patronizing several hundred hotels, and 1,624 farm houses. The volume of this business estimated by its cash receipts in 1899 was nearly $7,000,000.

State Institutions.— The New Hampshire Asylum for the Insane, founded at Concord in 1838, is supported by occasional State aid, the income of invested funds, and sums paid by individuals for care of patients. Each county has also its own insane asylum and almshouse. The State board of health is also a commission of lunacy. The New Hampshire Orphans' Home was established at Franklin in 1871. It is undenominational, and is supported by voluntary contributions. The State prison at Concord was established in 1812. There is also an industrial school at Manchester, and a School for the Feeble Minded at Laconia. The New Hampshire Conference of Charities and Correction is a semi-official organization, wholly educational in its purposes. A considerable number of well ordered and beneficent institutions devoted to hospital purposes, the care and education of orphans and other worthy objects of religious charity have been established at populous points and are maintained by the authorities of the Roman Catholic Church. Many local hospitals are established under secular control, by municipal support or through private benefactions. Eighteen of these institutions are located as follows: Berlin, Claremont, Manchester (3); Plymouth, Exeter, Dover, Nashua (2); Laconia, Hanover, Concord (2), Portsmouth, Woodstock and Whitefield. Homes for orphans and retreats for the aged are established at Manchester and Concord, one by the Masonic fraternity and the other by the order of Odd Fellows.

Public Health.— This function of the State government has been developed to a very efficient status since its inception in 1881. The science of preventative medicine is applied with intelligent efficiency and upon the most approved modern methods. Registration of vital statistics, bacteriological analysis and other subjects related to State medicine are under the direction or supervision of the State board of health. Independent of the Board of Health, both in action and organization, and yet properly regarded as agencies of the State's paternalism in respect to the public health, are the department of examination and registration of practitioners of medicine, auxiliary to which are the several boards of examiners designated by the state associations of doctors of medicine representing the several schools of practice, the similar board appointed by the state association of dentists, and the commissioners of pharmacy and practical chemistry. The New Hampshire Medical College, established at Hanover in 1798, is a high class institution and practically a department of Dartmouth College.

Public Libraries.— New Hampshire has been a pioneer in and sturdy supporter of the library movement. Perhaps the earliest mention we have of it is in connection with a lottery in Portsmouth in the year 1750 in aid of an association library. From 1792 to 1883, 220 libraries received special charters from the legislature. These were mostly private library corporations which have now given place to, or become merged in the public library. The first free public library in the United States was established in Peterborough in 1833. The State was in 1849 the first to pass a law authorizing towns to aid in establishing and maintaining public libraries. This was followed logically by the second and third steps in the progress, namely, by the law of 1891 granting State aid to town libraries, and by the compulsory law of 1895, requiring every town to appropriate a certain proportion of its taxes for the support of a public library. The first legislative incorporation of a State library association was by New Hampshire in 1889. In May 1903, 296 public libraries were reported. The number of books contained in them and accessible to the public, exclusive of reports and pamphlets, was 801,463. The State Library now occupies a separate establishment and has a collection of nearly 100,000 volumes.

Education.— Since 1885 the common schools of the State have been organized on the town district system. Attendance from 8 to 14 is compulsory. In the school year of 1899–1900 the total enrolment of pupils was 35,688, or 73.97 per cent of the entire school population. The average number of days for the year was 147.65, and the number of teachers 2,740. The total value of school property was estimated at $4,052,202. The State Normal School was established in 1870, and is located at Plymouth. Its attendance in 1901 was 122. There are 30 academies and seminaries, and 3 colleges: Dartmouth, founded at Hanover, 1769; New Hampshire College of Agriculture and Mechanic Arts, at Durham; and Saint Anselm's College, at Manchester. Among the secondary schools of national reputation are Saint Paul's at Concord and Phillips Exeter. The cities and larger towns all have high schools supported by the public taxes and revenue. Seventy-one seminaries, academies and high schools are registered by the State Superintendent of Instruction as equipped to provide college preparatory courses. Tuition, text-books and all school supplies are free to the pupils to the completion of the high school course. Parochial schools are in successful operation in many places under the control and patronage of the Roman Catholic Church.

Military Affairs.—Between 1675 and 1762 the people of New Hampshire participated in six wars against the French and Indians, aggregating a period of 38 years. The frontier position of the State made it peculiarly exposed to attack by the Indians, from whose ravages it suffered severely. The State contributed 500 men toward the siege of Louisburg, and the same number for the operations at Crown Point in 1755, and at other times in this war 2,600 more soldiers. In 1775 the population of the colony

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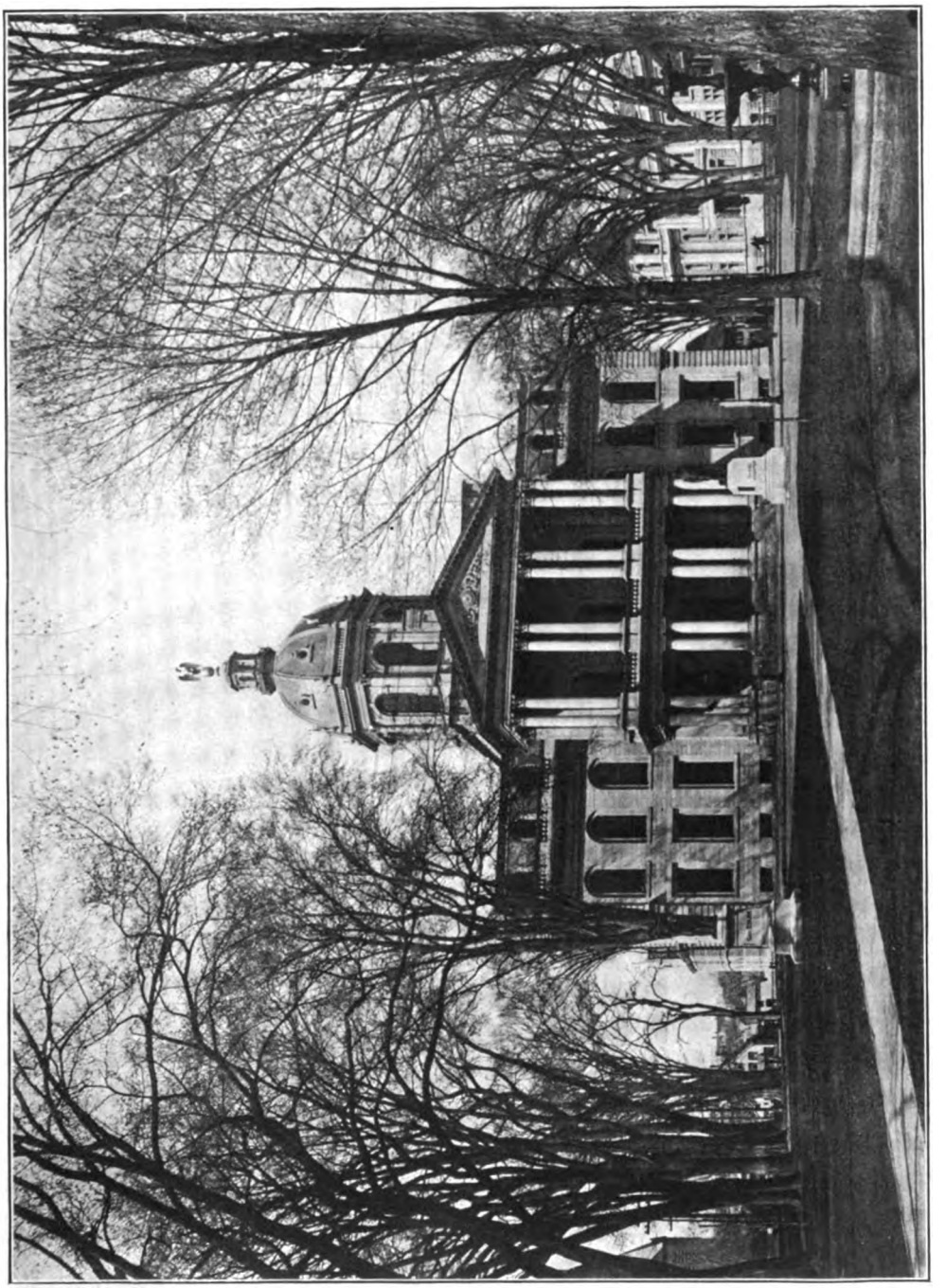

CAPITOL BUILDING AT CONCORD.

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was only 82,200. In the province militia establishment there were 13 regiments of foot and 1 of cavalry, besides special organizations of cadets and of artillery. The capture of Fort William and Mary in Portsmouth Harbor, under the leadership of John Langdon and John Sullivan, occurred 13 Dec. 1774, over four months before the battle of Lexington. The powder which was taken on this occasion later supplied the patriot army assembled about Boston, and was returned to the British in a different form at the battle of Bunker Hill, so-called, where New Hampshire men constituted over one half the Americans actually engaged. The passing of royal authority in the province was attended with very little commotion, and comparatively no manifestation of violence. The convention of 21 April 1775 caused a reorganization of the militia in August of that year, and in 1777 the number of regiments had been increased to 17. The number of men enrolled in 1775 was 16,710, and this comprised practically all residents of military age in the State. In that year three regiments were raised for service in the continental field. One regiment was in Canada; 33 companies under Colonel Wingate were guarding the sea-coast; 2 companies of men from this State were detached from Washington's army and accompanied Arnold in his famous march through Maine to Quebec, Coos and the Connecticut Valley were guarded, while 31 companies were raised to replace the Connecticut men who declined to remain longer at the siege of Boston. Undoubtedly more than 5,000 of the men of this State were in the field in 1775. In 1776 the three New Hampshire regiments of the Continental line were continued and strengthened, distinguishing themselves in the Canadian service, at Trenton and Princeton. Sullivan for superior conduct in bringing the unsuccessful American forces out of Canada in 1776, in the face of formidable difficulties, was made a continental major-general. Bedel led a new regiment into Canada, while one regiment was transferred from the coast to the aid of Ticonderoga, and four more regiments reinforced the patriot army at different points that year. New Hampshire's contributions reached high water mark in 1777. In May large bodies of organized militia marched to the relief of Ticonderoga. The regiments in the continental line remained in service and distinguished themselves at Stillwater, Saratoga, and other critical points. Stark's brigade at Bennington struck the blow which decided the fate of Burgoyne's invasion. When Stark's men returned to their farms and harvests, Whipple's brigade was forwarded with promptitude and energy to reinforce the northern army under Gates. Meanwhile Stark assembled another force of New Hampshire volunteers and with them was in season in this, his second campaign of the year, to complete the investment of Burgoyne along the Fort Edward fords. A number of New Hampshire companies also served against Burgoyne in Vermont organizations. In addition a regiment was sent to the aid of Rhode Island. The winter of 1778 found the New Hampshire men of the continental line at Valley Forge, and in the summer Whipple's brigade took part in the Rhode Island campaign under General Sullivan. In the remaining years of the war New Hampshire contingents served where the exigency of the contest led them, from the northern frontier to Virginia, bearing themselves with valor and effectiveness at Monmouth, against the Six Nations, and acting an important part in the campaign which culminated in the surrender of Cornwallis at Yorktown. One New Hampshire regiment, at least, and possibly two, and John Stark, who had been made a continental brigadier-general after Bennington, continued in the regular or permanent continental service under Washington or in other important commands until the end. Among the New Hampshire statesmen whose names must always stand high on the records of revolutionary service and achievement are Weare, Langdon, Livermore, Bartlett, Dudley and Gilman, and conspicuous also in military fame are Sullivan, Stark, Poor, Scammell, Whipple, Cilley and Dearborn. It is not improbable that of approximately 17,000 men in New Hampshire then capable of bearing arms, about 20 per cent of the total population, nearly every man was in active service, and, many of them, through repeated terms of enlistment; and in that seven years of struggle, no armed enemies in visible organization crossed the boundaries of the Granite State.

War of 1812.—Early in the War of 1812 Portsmouth was fortified and garrisoned, and the northern frontier guarded by a company at Stewartstown. Many New Hampshire men distinguished themselves in this war, among whom was Major-General Henry Dearborn, the Revolutionary war veteran, and Major-General Eleazar Wheelock Ripley, later a member of Congress for Louisiana.

Mexican War, 1846-8.—Upon the outbreak of the Mexican War the State responded with spirit to the calls of the President, and promptly forwarded its quota. Franklin Pierce was a brigadier-general, and participated in Scott's campaign. Several New Hampshire men who later became prominent in the war for the Union began their military career at this time.

War of 1861-5.—In the war for the Union, 17 full regiments of infantry were sent into the service from New Hampshire. The State also contributed a battalion of cavalry, afterward enlarged to a regiment, a part of a separate (17th) regiment, united with the second, three companies of sharpshooters, a battery of light artillery, and a regiment of heavy artillery. Besides these it furnished a liberal number of men for the navy. The total number in the service was 32,750, or 10 per cent of the whole population. Their record was long and brilliant. The first Kearsarge was a New Hampshire ship. A good number of marines and sailors and a long array of worthy naval officers represented the State in that branch of the public service.

There were no military leaders in this war, residents or natives, of New Hampshire, who would be assigned to the class in which Grant, Thomas, Sherman and Sheridan stood. On the civil side, however, both in the war period and in the reconstruction years, natives and residents of this State were conspicuous at the very fountain heads of power and influence. In the Senate Wilson, a native of Farmington, was chairman of the committee on military affairs, Hale, naval affairs, Fessenden, native of Boscawen, finance and appropriations, Grimes, native of Deering, District of Columbia, Z. Chandler, native of Bedford, commerce, and Clark, claims and president *pro tempore*. In the cabinet suc-

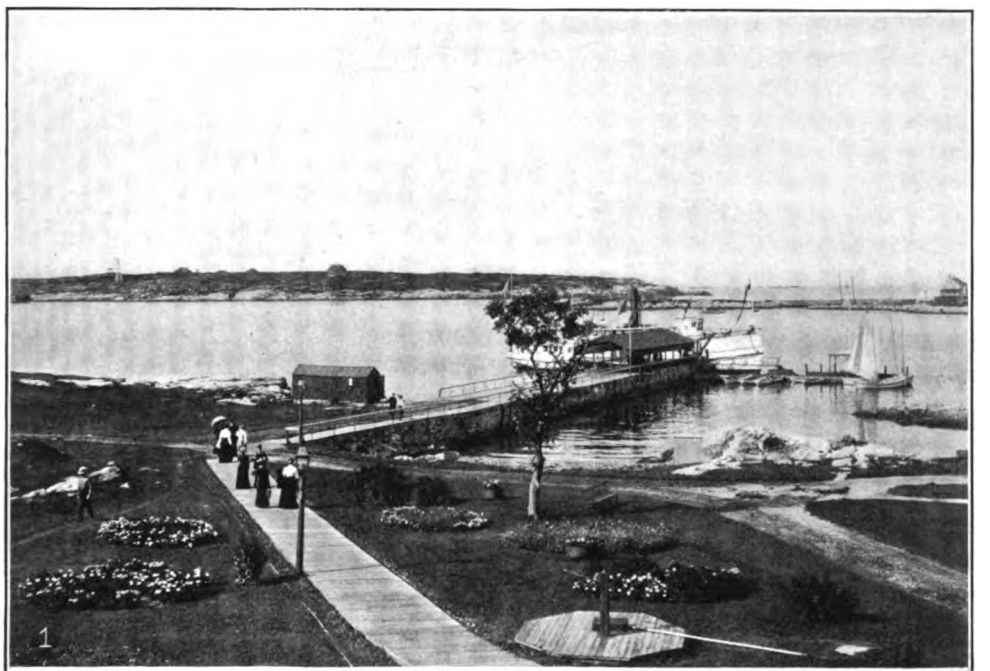
cessively holding the treasury portfolio were Dix (Boscawen), Chase (Cornish) and Fessenden. Greeley, native of Amherst, was the greatest intellectual force in the journalism of that day. Dana was assistant secretary of war. Dix, Butler, native of Deerfield, John G. Foster, native of Whitefield, and Fitz John Porter, native of Portsmouth, were major-generals. Walter Kittridge, author of 'Tenting on the Old Camp Ground,' and Charles Carleton Coffin, who was the historian of the war for the youth of the land, were of the Granite State. In the naval service were John G. Walker, Belknap, Parrott, Pearson, Storer, Wyman, Pickering, Prentiss, Browne, Long, Miller, William S. Walker, Perkins, Spence, Thornton, Park, and Craven. In the years immediately following the War, Zachariah Chandler, W. E. Chandler, Marshall Jewell and Amos T. Akerman of the New Hampshire stock were called to the cabinet, Horace Greeley and Benj. F. Butler were named for the presidency, and Salmon P. Chase ended a notable career as chief justice of the Supreme Court of the United States.

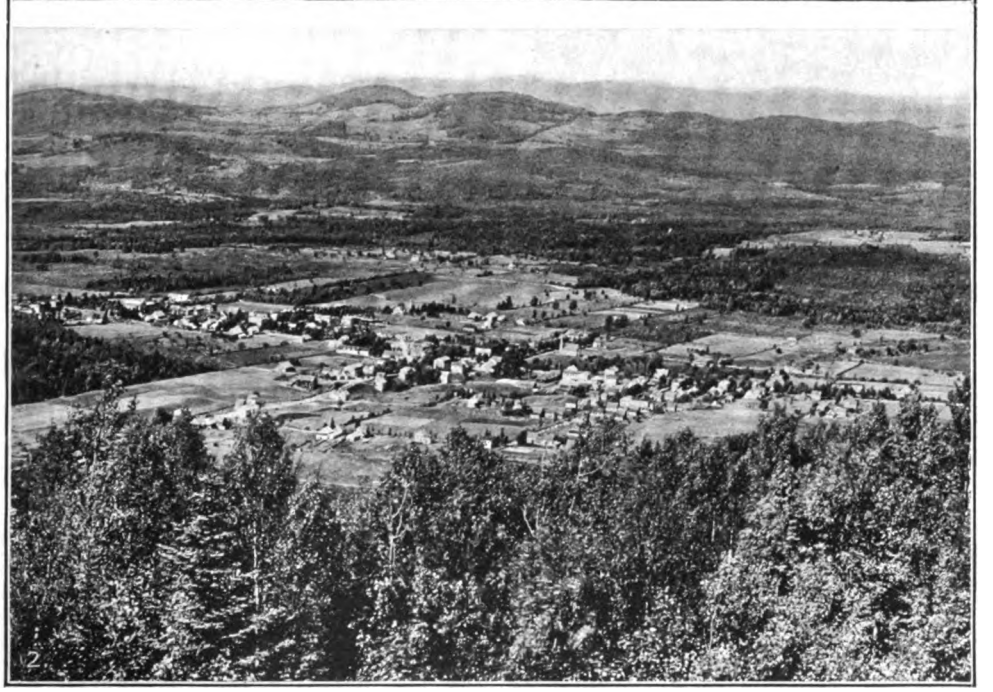
Spanish-American War, 1898.— In the war with Spain New Hampshire's quota, a full three battalion regiment of infantry, though filled with promptitude, was not called upon to go farther than the concentration camp at Chickamauga. This regiment was commanded by Robert H. Rolfe. General Leonard Wood was a native of New Hampshire, as were Admiral Asa Walker and other distinguished naval officers.

National Guard.— This organization has a brigade formation. There are now two regiments of infantry, each of 12 companies, in battalion arrangement; a four gun light battery; a troop of cavalry; signal corps; hospital corps; and two regimental bands — 109 officers, 48 musicians, 1,175 enlisted men — total 1,332.

History.— Three of the four original towns, Portsmouth, Dover, Exeter and Hampton, occupied the interesting position of independent democracies between 1622, the year when Thomson's indenture was drawn and the first settlement definitely planned, and 1643, when they had all become, by their own choice or the necessities of their situation, constituent parts of the Massachusetts Bay Colony. This was the first union with Massachusetts Bay, and was conditional on certain important privileges and guarantees accorded to the towns by the Massachusetts General Court. The history of the period of this union is in a large measure identical with that of Massachusetts Bay. In 1679 the Masonian heirs succeeded in procuring in the home government orders for the establishment of a separate province for these four frontier towns. John Cutt, a merchant of Portsmouth, was the first President, as the chief magistrate was then styled. The four towns were made a part of the Dominion of New England in 1686. This government under Dudley and Andros survived only three years. From the spring of 1689 to the latter part of the winter of 1689–90 the New Hampshire towns governed themselves in the independent democratic fashion of the first period of their history. A second union with Massachusetts Bay was then effected and continued for two years. In 1692 the province government by royal commission was re-established and subsequently administered by appointees of the crown until 1775. With the governor was associated a lieutenant governor, and a council appointed by the king. The legislative function was vested in a general assembly constituted of the governor, the council, and the deputies, elected by freeholders. The right of veto was committed to the governor and the right of confirmation and disallowance of laws remained with the crown. From 1699, when the Earl of Bellomont assumed office, to the termination of Belcher's administration 1741, this province and Massachusetts had the same governor. The provincial assembly was continued until the departure of Governor John Wentworth in 1775. A succession of conventions beginning with that of 21 July 1774, finally resulted in the formal organization of a legislative body on a full representation of the people in view of the apparent necessity of establishing a new state government. The people of New Hampshire entered upon the active stages of a national movement for independence with deliberation and unanimity. Perhaps no one of the colonies was so free from the so-called loyalist element as was this. The «Association Test» put every man on record, either for or against the common cause. The original files are preserved, and the names of those who dissented or refused to take an unequivocal position constitute a surprisingly meagre list.

The civil government of New Hampshire from the time of the departure of Gov. Wentworth to the organization of a new form of government in June 1784, under the constitution of 1783, was purely legislative. The constitution of 1776, probably the first adopted by either of the thirteen States, by its own independent action, was a brief instrument and evidently intended to be temporary, or, as it was officially stated at the time, "to continue during the present, unhappy and unnatural contest with Great Britain." It was adopted and promulgated by the fifth convention, chosen in the latter part of 1775, and it was never submitted for acceptance or rejection to (or formally ratified by) the people. During the period of the Revolution the administrators of the New Hampshire government were embarrassed by a serious defection in the western part of the State, and particularly in Grafton County. Many of the leading men of the Connecticut River towns were from Connecticut, and their ideas of government were naturally in accordance with their education and experience in the commonwealth from which they had emigrated. The form of government temporarily adopted by the Fifth Provincial Congress was not acceptable to the majority of these people. The group of towns which included Gunthwait on the north and Lebanon on the south in Grafton County organized themselves into associations for purposes of civil and military government, and formally declined to recognize the new state government of New Hampshire. The contention of the «New Connecticut» party, so called, was, that upon the dissolution of political relations between the colonies and the mother country, and more especially in respect to the territory in controversy between New York and New Hampshire, the towns, being the political units, and the original source of political authority, were invested with the right to determine for themselves the question whether to accord





1. Star Island, Isles of Shoals.

2. Bethlehem, White Mountains.

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allegiance to one or the other of the disputing States, or whether to erect themselves into an independent State. They urged that inasmuch as the constitution of 1776 had never been submitted to the people, or to the towns for ratification, and had been accepted by a part of the towns only, it was operative only upon such as had elected to ratify its provisions. Their argument was presented with great skill and effectiveness, and although the movement ultimately failed to accomplish its purpose, its sponsors succeeded in making themselves felt as a political force to be reckoned with by three established States, and the Continental Congress, as well as the prospective commonwealth of Vermont. In 1783 a new State constitution, modeled closely upon the Massachusetts constitution of 1780, was adopted, which, except as modified by the amendments emanating from the subsequent conventions of 1791–2, 1850, 1876, 1889, and 1902, still remains in force. In 1787 a Federal convention formulated a constitution for the United States of America. At this critical time the Constitution became the organic law of the new nation on its ratification by New Hampshire, the ninth State, in June 1788. John Langdon of New Hampshire was chosen president, *pro tempore,* of the first session of the United States Senate under the new Constitution, and to him fell the honor of informing Washington of his election to the presidency. In the years immediately ensuing the Federalist party was evolved and was in political control at an early date in this State, but gave place to the Anti-Federalists, then known as Republicans — the Jefferson party of that day — from 1805 to 1812 (both of these years inclusive,) except 1809, when Jeremiah Smith, Federalist, broke in upon the succession as Governor. In 1813, 1814, and 1815 the Federalists were again in control of the State. In 1816 they met with irretrievable defeat, and thereafter the Jeffersonian Republicans remained in power, excepting in the brief period of a temporary reverse in 1846, until permanently overthrown in 1855 by the American party, more commonly called the "Know-nothings." The earlier part of this period was one of ecclesiastical agitation. The people of New Hampshire had become in the later colonial period almost entirely Congregationalists, and that denomination had maintained its ascendency as practically a state church during a long period, the town ministers being called by the church, approved in town meeting and supported by public taxation. Universalists, Baptists, Methodists, and Free Thinkers had now become potent enough to assert themselves effectively in politics, and the contest reached its culmination in the so-called toleration act of 1819. Hosea Ballou, a New Hampshire minister, was the founder of Universalism in its modern form, and Benj. Randall, another minister of this State, was the founder of the Free Baptist denomination. The latest New Hampshire contribution to religious denominationalism is Christian Science, the founder and chief exponent of which is a resident and native of this State. In this year, 1819, also, was decided the historic Dartmouth College case, which Senator Lodge described as one "in its effects more far-reaching and of more general interest than perhaps any other ever made in this country." Through this futile attempt by the State to amend the charter of Dartmouth College for the purpose of reorganizing the government of the institution, inviolability of charters never before enjoyed was secured. Incidentally the case served to make prominent and to bring into the view of the whole country the fact that in Daniel Webster, Jeremiah Mason, Jeremiah Smith, Ichabod Bartlett, and their compeers, there was at the bar of New Hampshire, and on the bench of her highest court, a group of jurists whose law learning and forensic ability could not be surpassed at that day in the entire length of the Union.

In 1826 occurred the anti-Masonic uprising, which drifted into politics, and for a time commanded serious attention. The second quarter of the 19th century was remarkable for the number of men of New Hampshire birth and residence who held commanding positions in shaping the destiny of the republic. The names of Webster, Cass, Woodbury, Pierce, Kendall, Chase, Hale, Atherton, Clifford, Tuck, and Greeley constitute a conspicuous part of a long list that might be enumerated.

The years following 1846 were marked by the development of a strong reform sentiment especially in the cause of temperance and on the slavery question. In case of the former, the movement resulted in the prohibitory law 1855, which became the accepted principle of liquor legislation until at length a reactionary sentiment expressed itself in the license act of 1903. The slavery movement found many earnest and devoted adherents, intense and uncompromising in their propaganda. The Free-soil vote had already appeared in 1841, and continued to be of more or less importance until 1856. Until 1896, with the exception of a significant, and with many of its participants, permanent revolt from the Republican party in 1872, political alignments had been strictly maintained, and political contests had usually had more or less of the hazard of uncertainty. The Free-silver agitation of 1896 found New Hampshire voters strongly in favor of the gold standard, and led to many transfers of party allegiance. Since 1856, the Republican party has had control of every department of the State government and carried every State election except in the years 1871 and 1874.

In the constituents of population, the descendants of the original New England stock still predominate. From an early date, however, there have been at intervals important additions of Irish Presbyterians and Irish Catholics. The representatives of this race from both its sectarian branches, have been speedily assimilated and are adepts at leadership in business, the professions and public affairs. The German immigrants manifest the same assimilative tendencies. The Canadian French are becoming also an important part of the population. They adapt themselves with facility to trade, agriculture, mechanics, and as operatives in manufacturing establishments. They are represented in all the learned professions, but more numerously in the priesthood and medicine. The activities and resources of the State, religious, benevolent, commercial, industrial, educational, and productive, as manifested in visible results, were never in more satisfactory adjustment having reference to a fair and reasonable dis-

tribution of burdens and benefits than to-day; and the State government in all its branches is administered in conformity with such principles as to command the respect and approval of the governed.

A. S. BATCHELLOR,
Editor of State Papers, Littleton, N. H.

New Hampshire College of Agriculture and Mechanic Arts, opened in 1867, at Durham, N. H. The courses offered include the regular four years' courses in agriculture, mechanical and electrical engineering, technical chemistry, and general science, for completion of which the degree of B.S. is conferred; a two years' course in agriculture; and ten weeks' winter courses in agriculture and dairying. There is also a preparatory department; and the State experiment station is connected with the college. Women are admitted to all courses, but form a small proportion of the student body. The income of the college is derived from the Federal land grant of 1862 and from Federal and State appropriations; in 1902 the total amounted to $63,830; the students numbered 126 (13 women), and the faculty 27.

New Han'over, an island of the Bismarck Archipelago (q.v.), about 40 miles long and 20 miles broad, northwest of New Ireland, or New Mecklenburg (q.v.), from which it is separated by Byron Strait.

New Har'mony, Ind., town, in Posey County; on the Wabash River, and on the Illinois Central railroad; about 25 miles in direct line northwest of Evansville. The first settlement was made by a German community called Harmonists (q.v.), in 1815. In 1824 Robert Owen purchased the village and domain and the Harmonists returned to Pennsylvania. The next year Owen established a "Preliminary Society" and issued a general invitation to all "the industrious and well disposed of all nations" to join the new community which was to be governed and conducted on new plans. All goods were to be held in common, but their use was regulated by age; "moral lectures" were to replace religious worship; the young were to be educated by trained teachers, and this education was to begin when the children were two years of age. The whole experiment proved a failure; those who accepted the invitation were not all "well disposed" and many were far from "industrious." In 1826 Owen assumed control of the community and established order; but in a few months dissensions arose, three communities were formed of the original one, and soon after the "community idea" was abandoned. One of the leaders, William Maclure, purchased part of the land and established an industrial school which also was a failure. The free library of the Workingmen's Institute, established in 1838, is in a most flourishing condition and contains about 16,000 volumes. The town has some manufacturing establishments, chief of which are flour and lumber mills and brick works. Pop. (1890) 1,197; (1900) 1,341.

New Haven, Conn., city and county-seat of New Haven County, and the largest city in the State. It is popularly called "the City of Elms" from the magnificent elm trees planted there over 100 years ago. New Haven lies at the head of New Haven Bay, four miles distant from Long Island Sound. It is on the New York, New Haven & Hartford railroad, 36 miles from Hartford and 74 miles from New York city.

Topography.—The city lies on a level sandy, plain, bordered on the east and west by the West and Quinnipiak rivers. It has an area of 23 square miles. "The Old Green" is a public square in the centre of the city, about which the original settlers lived, and used at night as a corral for their cattle. It also for years was the public burial ground. The bones of thousands lie there to-day. Near the city limits rise East Rock and West Rock, 360 and 400 feet in height respectively, from the summits of which a fine view of the city and surroundings may be obtained. East Rock, which has been made into a park, is crowned at its summit by a monument dedicated to the Connecticut soldiers and sailors who fell in the Civil War. The entire park system in New Haven embraces nearly 1,200 acres. The sewer system is most complete, including 95 miles of sewer.

Streets and Avenues.—Chapel street, the business promenade, extends in a northwesterly direction throughout the length of the city. The homes and dwelling houses are generally surrounded by gardens, and many of them are almost hidden from view among trees. The number of magnificent elms with which the principal avenues are planted were mostly set out about the close of the 18th century by James Hillhouse, or through his influence and example. Early residents laid out the city with six streets running nearly north and south and six streets running east and west, but this plan was rejected owing to the position of the harbor, and roadways were built at various angles, with "The Old Green" as a common centre. In 1903 there were 225 miles of streets and avenues, of which 90 miles were paved.

Prominent Buildings.— Here is the seat of Yale University (q.v.), with its numerous halls, dormitories, schools and special buildings which are celebrated in educational and historical annals. The Yale Campus, which lies two blocks west of "The Old Green," is a rectangle containing two city blocks. A series of college buildings form an enclosed court about the campus. Two of these buildings, Vanderbilt and Osborn Halls, are among the chief architectural attractions of the city, though Woolsey Hall is the most beautiful of all the university buildings. The Sheffield Scientific School and the departments of law and medicine, are a little removed from the campus. The Hopkins Grammar School, founded in 1660, is also located here. Other buildings and institutions are the State Normal School; the Boardman Manual Training School; the Hillhouse High School; New Haven Hospital; Grace Hospital; Saint Francis Roman Catholic Orphan Asylum; the Public Library, containing 60,000 volumes; New Haven Orphan Asylum and the Young Men's Institute. Here are also the archives and libraries of the New Haven Colony Historical Society and the American Oriental Society.

Churches and Schools.— New Haven has 70 churches, some of which were built as early as 1800. In the old burying ground in Grove street are the graves of Noah Webster, Theodore Winthrop, Eli Whitney, F. B. Morse and other celebrities. The churches are divided among the following denominations: Congregational, 17;

Methodist Episcopal, 14; Protestant Episcopal, 12; Roman Catholic, 9; Baptist, 7; Lutheran, 4; Jewish, 4; and Universalist, Unitarian, and others. There are 40 public school buildings in the city, with a daily attendance of 20,000. The school system is maintained at a cost of $380,000 annually.

Trade and Commerce.— New Haven up to the middle of the 19th century was an important ship-building centre, but this industry has gradually diminished. Ship-building interests were seriously crippled by the Embargo (q.v.) and the War of 1812. There is an excellent natural harbor here which has been improved and enlarged at State and Federal expense. New Haven has two lines of steamships to New York and is the commercial and distributing centre for a large section of the State. In manufacturing New Haven ranks first among Connecticut cities, and has many and varied industries, including clocks, watches, hardware, firearms, ammunition, wagons, carriages, engines and boilers, automobiles, rubber goods, wearing apparel, iron foundries, machine shops, canneries and packing houses. The headquarters and repair shops of the New York, New Haven & Hartford railroad are also located here. According to the last census, New Haven industries represent a capital of $30,464,000, with an annual production valued at $40,762,000. Over 20,000 persons are employed in the 1,300 factories of the city and over $12,000,000 are annually paid in wages. The city has a dozen national banks, and numerous trust companies, state banks, savings banks and buildings and loan companies.

Government.—The city maintains a consolidated town and municipal government under a special charter of 1897; the name New Haven being applied to three distinct corporations, the city, the town and the school district of New Haven. The corporate limits of the town and the municipality are the same. A mayor, elected every two years, is the city's chief executive, and he has the power to appoint a majority of the municipal administrative officers. The city affairs are administered by a board of aldermen of 21 members, which appoints the assistant city clerk. The sheriff, city treasurer, collector of taxes, city clerk and comptroller are elected every two years by popular vote. In the town government the administration is in the hands of a board of selectmen of seven members, elected by the people at regular town meetings. The administration of the school district is in the hands of a Board of Education of nine members, appointed by the mayor. The fire and police departments of the municipality are managed by Boards of Commissioners, the latter bi-partisan. The central clearing house is the Board of Finance, which fixes the rate of taxation and makes the appropriations.

Municipal Finances.—The assessed valuation of real and personal property is more than $120,000,000, including exemptions. The provided debt of the city amounts to $3,500,000. The city expends each year for maintenance and general expenses $1,415,000; of which the largest item is $380,000 for schools; police department, $190,000; fire department, $150,000; interest on provided debt, $140,000; street cleaning, $90,000; lighting, $80,000; charity, $75,000.

History.—New Haven was settled in 1638 by a company of Puritans chiefly from London under Theophilus Eaton, their first governor, and the Rev. John Davenport. It was a distinct colony until 1660, when after a protracted struggle it was united with Connecticut under the charter of 1662. It was incorporated as a city in 1784. In its earliest days New Haven was called Quinnipiak by the Indians. It was also called Roodenberg by some of the early colonists. The Indian chief Momanguin sold a large tract of land here to the London company, receiving in return an assortment of coats, hatchets, spoons and knives. Treaties were signed by both parties, the Indians agreeing not to "terrify, disturb or injure" the settlers, who in turn promised to protect the Indians, and allow them to hunt in portions of the ceded territory. Another tract 10 miles wide by 12 miles long was purchased six months later, and in June 1639 a fundamental and written constitution was adopted by the settlers. The privilege of voting and holding office was strictly limited to church members. In both civil and church affairs the Bible was the only recognized law.

Theophilus Eaton, the first governor of the New Haven Colony, was re-elected and retained the office until his death in 1658. The city of New Haven was incorporated in 1784 and Roger Sherman was its first mayor. He was mayor and United States Senator when he died. The settlement took its name from Newhaven, England, and under its first charter of 1662 embraced the towns of Milford, Stamford, Guilford and Branford, and this confederation known as the "New Haven Colony" entered the New England Union. In 1701, New Haven was made a joint capital with Hartford, and remained as such until 1873. Yale College was removed from Saybrook to its present site in 1717. The town was captured 5 July 1779 by a British force under Gens. Tryon and Garth after a sharp skirmish. In this engagement the Americans lost 29 killed and 17 wounded, while the British loss was 70 killed and 40 wounded. After its incorporation as a city New Haven began to make rapid strides. Steamboat communication was opened with New York in 1815, and the first railroad entered the town in 1848.

Population.—In 1800 New Haven had a population of 4,049; (1850) 20,345; (1870) 50,840; (1880) 62,882; (1890) 81,298; (1900) 108,027, including 30,000 of foreign birth and 2,800 of negro descent. The estimated population in 1903 was 112,500, plus.

Bibliography.—Atwater, 'History of the City of New Haven' (1887); Barber, 'History and Antiquities of New Haven' (1870); Bartlett, 'Historical Sketches of New Haven' (1897); Lambert, 'History of the Colony of New Haven' (1838); Levermore, 'Republic of New Haven' (1886); and 'Papers of the New Haven Colony Historical Society' (1865–1902).

N. G. Osborn,
Editor 'The New Haven Register.'

New Haven Colony. See New Haven, Conn.

New Hebrides, hĕb'rĭ-dēz, a group of islands in the South Pacific, east of Australia, extending from lat. 13° to 20° S., and from lon. 165° to 170° E.; area, about 4,900 square miles. The largest ones are Mallicollo, and Espiritu Santo (q.v.). Tanna has an active volcano; and in consequence probably of vol-

canic action, Aurora, one of the most fertile, sank out of sight in 1871. Some of the group are of coral formation. They are all wooded and hilly; ebony and sandalwood being obtained; their chief products are yams, bananas, cocoanuts, and sweet potatoes. The chief animal is a small pig, not larger when full-grown than a rabbit. The native inhabitants, belonging to the Papuan race, are in general degraded and very ferocious, except on Aneityum, where there are Christian missions, and where the majority of the inhabitants can read and write. These islands, according to the Anglo-French convention of 1887, are under the control of a mixed commission of French and British naval officers. The population is decreasing; in 1901 it was about 50,000.

New Iberia, ī-bē'rĭ-ạ, La., town, parish-seat of Iberia Parish, on the Bayou Teche, and on the Southern Pacific railroad; about 100 miles in direct line west of New Orleans. A short railroad extends to Avery Island, where there is a valuable salt-mine. It is in a fertile agricultural section, in which the chief products are the pepper, from which tabasco sauce is made, cotton, sugarcane, corn, rice, vegetables, and berries. It has considerable manufacturing; some of the industrial establishments are machine-shops, a knitting-mill, ship-yards, foundries, wagons, brick works, soap factories, cottonseed-oil mills, factories for different lumber products, and tabasco sauce factory. The town is in a section of the State mentioned by Longfellow in 'Evangeline.' It has a government building, a city-hall, and a large public market. Its educational institutions are the public and parish schools for white and colored children, a high school, and a public high school library. The city owns and operates the electric-light plant and the waterworks. Pop. (1890) 3,447; (1900) 6,815.

New Ireland. See NEW MECKLENBURG.

New Jersey, the "Garden State," and one of the original 13, adopted the Federal Constitution, by unanimous vote, in convention 18 Dec. 1787. The State is bounded on the north and east by New York and the Atlantic Ocean, on the south and west by Delaware and Pennsylvania. Of the 487 miles of total frontier, only 48 miles are defined by natural boundaries. Capital, Trenton. Area, 8,224 square miles, of which 710 square miles is water surface. The extreme length of the State is 166 miles, the narrowest portion being 33½ miles. Pop. (1900) State census, 1,883,669.

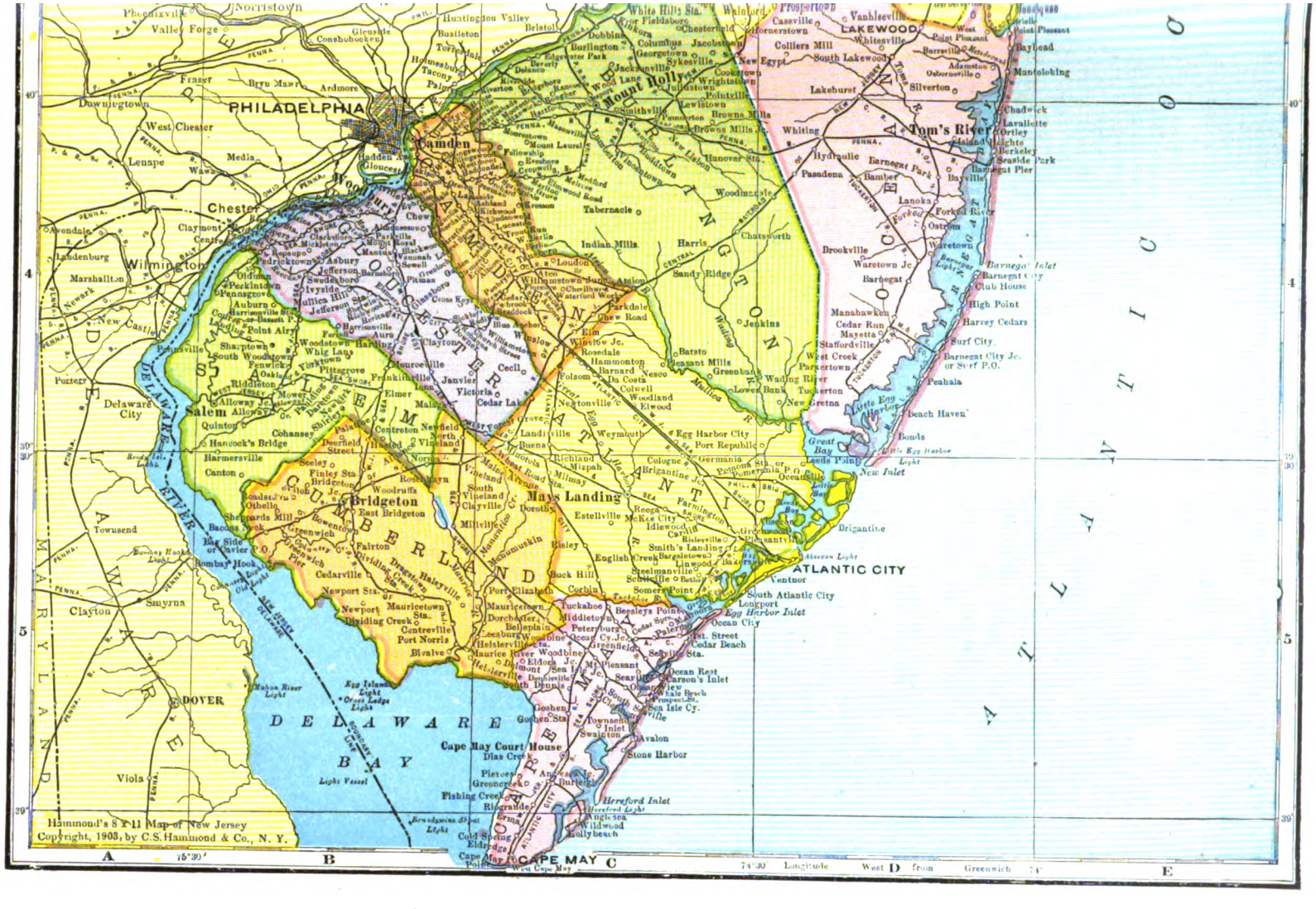
Topography and Geology.— The topographic features and geological structure of the State are intimately related and are explanatory of the surface conditions. New Jersey is characterized as being on the Atlantic slope of the continent and is divided into four topographic zones: (1) Appalachian, including the Kittatinny Mountain and Valley. (2) Highlands. (3) Red sandstone or Triassic area. (4) Coastal plain.

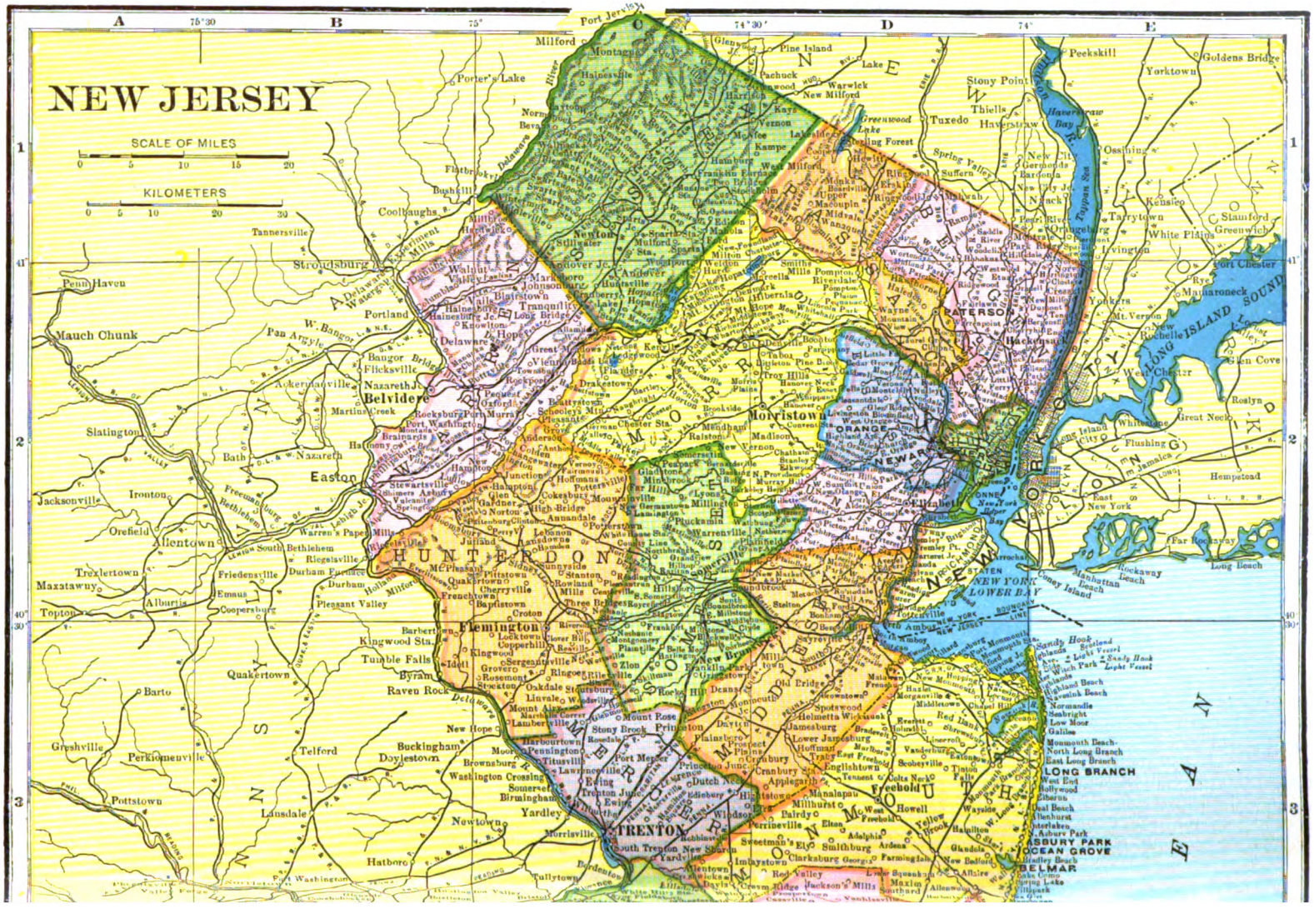
The Appalachian zone includes the Kittatinny or Blue Mountain and the Kittatinny Valley, occupying the northwestern portion of the State. This range is level-topped, narrow, rough, rocky and heavily wooded. It extends across New Jersey from the New York State line, where it is known as the Shawangunk Mountain, to the Delaware River at the Delaware Water Gap. At High Point, near the northernmost point of the State, it is 1,804 feet high, which is the greatest elevation of the State. The Kittatinny Valley, 10 to 13 miles wide, is shut in by the Kittatinny Mountain on the northwest and by the Highlands on the southeast. It is characterized by high, rolling hills and minor valleys, pleasing landscapes, and beautiful farming country. This valley is continuous, on the northeast, with the valley of Orange County in New York, and to the southwest stretches away into the great Cumberland Valley of the Atlantic slope of the continent.

The Highlands cross New Jersey in a general north-northeast and south-southwest direction. The surface of this zone is hilly-mountainous, and is made up of several parallel ridges, separated by deep and generally narrow valleys. The latter are like the Kittatinny Valley — smooth — and are largely cleared and in farms. The mountain ranges are remarkably uniform in height. This division may be considered as a seaward-sloping table-land, whose northwest side has an elevation of 1,000 to 1,500 feet above the ocean and its southeastern side 600 to 900 feet above the sea. In the northern part there are several lakes elevated amid the mountains — Hopatcong, Greenwood, Macopin, Splitrock, Green, Wawayanda, and Budd's being the more important of these natural upland sheets of water.

The Red Sandstone Plain or Triassic Area, also called the Piedmont plain, is bounded on its northern border by the Highlands. On the southeast, this third great topographic zone merges into the clays and marls of the coastal plain. It is 67 miles long and 30 miles wide at the Delaware River. The trap-rock ridges, known as Palisades, Watchung, Sourland, Cushetunk and other mountain ranges, rise abruptly above the general level of the sandstone plain. They are generally forested, whereas the sandstone country is nearly cleared and in farms. These mountains rise 400 to 900 feet above sea-level. The drainage is largely by the Hackensack, Passaic, and Raritan rivers and their tributaries.

The fourth zone, known as the coastal plain, includes all the country southeast of the Triassic sandstone area and borders the ocean. This zone is about 100 miles long from Sandy Hook to Salem City, and is 10 to 20 miles wide. The surface is hilly in part, but with gentle slopes, except where some of the streams have cut their way through its earthy beds and formed steep-sided stream valleys. The Navesink Highlands and the Mount Pleasant Hills are the highest lands in this zone. The drainage is by many tributaries westward into the Delaware, and by the Atlantic coast streams into the Atlantic Ocean. In the northwestern part of this zone there are clay beds and greensand marls, which make the outcrop on the surface in places; on the southeast there are sands, clays, and gravels, and fringing the sea a narrow range of sand hills or coastal dunes. Within the coastal plain lie the "Pines," a wooded area of so great an extent as to contribute largely to the forest acreage of New Jersey. In lots of 10 acres and over, there are 2,070,000 acres of woodland, with only 2,000,000 acres of im-


PHILADELPHIA
Camden
Trenton
Wilmington
Chester
Norristown
Phoenixville
Valley Forge
Huntingdon Valley
Bristol
Glenside
Conshohocken
Bustleton
Torresdale
Fraser
Bryn Mawr
Ardmore
Downingtown
West Chester
Media
Lenape
Wawa
Woodbury
Gloucester
Haddon
Claymont
Centre
Avondale
Landenburg
Marshallton
Newark
New Castle
Delaware City
Pennsville
Salem
Quinton
Hancock's Bridge
Harmersville
Canton
Townsend
Bacons Neck
Big Side or Carlet
Bombay Hook
Smyrna
Clayton
DOVER
Viola
Woodstown
Pennsgrove
Penns Grove
Oldmans
Perkinstown
Pennington
Auburn
Harrisonville
Point Airy
Sharptown
South Woodstown
Whig Lane
Yorktown
Pittsgrove
Riddleton
Mowers
Allowaystown
Shirley
Centreton
Newfield
Deerfield Street
Vineland
Norma
Seeley
Finley Sta.
Bridgeton
Woodruff
East Bridgeton
Shepherds Mill
Othello
Greenwich
Fairton
Cedarville
Newport
Newport Sta.
Dividing Creek
Maurice River
Port Norris
Bivalve
Mahon River Light
Egg Island Light
Cross Ledge Light
Light Vessel
Broadways Shoal Light
Hereford Light
Hereford Inlet
Five Mile Beach
Wildwood
Holly Beach
Cape May Court House
Dias Creek
Goshen
Goshen Sta.
Townsend Inlet
Swainton
Avalon
Stone Harbor
Sea Isle Cy.
Ocean Beach
Ocean Rest
Carson's Inlet
Ocean View
Whale Beach
Prospect St.
Seaville
Sea Isle Jc.
Dennisville
Dennis
Mt. Pleasant
Eldora
Woodbine
Maurice River
Leaming
Belleplain
Peterburg
Ocean Cy. Jc.
Greenfield
Cedar Swamp
Palermo
Tuckahoe
Middletown
Dorchester
Mauricetown
Mauricetown Sta.
Port Elizabeth
Corbin
Somers Point
Ocean City
Longport
Egg Harbor Inlet
Ventnor
South Atlantic City
ATLANTIC CITY
Brigantine
Absecon Light
Steelmanville
Scullville
Bethel
Smith's Landing
Bargaintown
Linwood
Pleasantville
Carlls
Idlewood
Reeds Bay
Farmington
Estellville
Mays Landing
Dorotty
Milmay
Richland
Mizpah
Cologne
Brigantine Jc.
Germania
Pomona Sta. or Pomona P.O.
Oceanville
Leeds Point
New Inlet
Great Bay
Little Egg Harbor
Little Egg Harbor Light
Bonds
Beach Haven
Peahala
Barnegat City Jc. or Surf P.O.
Surf City
Harvey Cedars
High Point
Club House
Barnegat City
Barnegat Inlet
Barnegat Light
Waretown
Waretown Jc.
Brookville
Ostrom
Forked River
Lanoka
Bayville
Barnegat Pier
Barnegat Park
Pasadena
Hydraulic
Whiting
Tom's River
Island Heights
Ortley
Chadwick
Lavallette
Berkeley
Seaside Park
Silverton
Lakehurst
Lakewood
Whitesville
Colliers Mill
South Lakewood
New Egypt
Cassville
Cornerstown
Prospertown
Vanhlesville
Point Pleasant
Bayhead
Mantoloking
Osbornsville
Adamston
Barrville
Jacksonville
Cookstown
Wrightstown
Pointville
Lewistown
Browns Mills
Pemberton
Smithville
Mount Holly
Juliustown
Columbus
Georgetown
Sykesville
Jacobstown
Burlington
Dobbins
White Hills Sta.
or Fieldsboro
Whitford
Chesterfield
Edgewater Park
Beverly
Delanco
Riverside
Riverton
Palmyra
Cinnaminson
Merchantville
Pennsauken
Collingswood
Haddonfield
Westmont
Lawnside
Magnolia
Audubon
Oaklyn
Fellowship
Evesboro
Creyonsco
Moorestown
Mount Laurel
Medford
Medford Lakes
Tabernacle
Indian Mills
Harris
Sandy Ridge
Chatsworth
Woodmanie
Jenkins
Batsto
Pleasant Mills
Greenbank
Wading River
Lower Bank
Tuckerton
New Gretna
Parkertown
West Creek
Staffordville
Manahawken
Cedar Run
Mayetta
Jackson
Lakehurst
Whitings
Chews Landing
Clementon
Berlin
Waterford
Atco
Hammonton
Elwood
Egg Harbor City
Port Republic
Weymouth
Landisville
Buena
Vineland
Newtonville
Elmer
Malaga
Cecil
Victoria
Cedar Lake
Janvier
Franklinville
Monroeville
Sea Shore
Oakland
Williamstown
Cross Keys
Sicklerville
Blue Anchor
Waterford Works
Chew Road
Parkdale
Absecon
Pleasantville
Egg Harbor
Folsom
Da Costa
Colwell
Woodland
Malaga
Landis Ave.
Vineland Ave.
Millville
Maurice River
Delaware Bay
Atlantic Ocean
Hammond's 8 X 11 Map of New Jersey
Copyright, 1903, by C.S. Hammond & Co., N. Y.
39° 30'
74° 30' Longitude West from Greenwich
A
B
C
D
E


NEW JERSEY
SCALE OF MILES
0 5 10 15 20
KILOMETERS
0 5 10 20 30
A
B
C
D
E
75°30
75°
74°30'
74°
Port Jervis
Milford
Montague
Porter's Lake
Pine Island
Lake
Peekskill
Goldens Bridge
Yorktown
Stony Point
Tuxedo
Thiells
Haverstraw
Haverstraw Bay
Ossining
Tarrytown
Kensico
Stamford
Greenwich
White Plains
Irvington
Yonkers
Mt. Vernon
Port Chester
Rye
Mamaroneck
New Rochelle
LONG ISLAND SOUND
Glen Cove
Roslyn
Whitestone
Great Neck
Flushing
Jamaica
Hempstead
East New York
Far Rockaway
Rockaway Beach
Long Beach
Manhattan Beach
Coney Island
NEW YORK LOWER BAY
Sandy Hook
Sandy Hook Light Vessel
Highland Beach
Sea Bright
Normandie
Monmouth Beach
North Long Branch
East Long Branch
LONG BRANCH
West End
Hollywood
Elberon
Deal Beach
Interlaken
Asbury Park
ASBURY PARK
OCEAN GROVE
Bradley Beach
BELMAR
Lake Como
Spring Lake
Wreck Pond
ATLANTIC OCEAN
Tuxedo Park
Greenwood Lake
Sterling Forest
Warwick
New Milford
Pine Island
Pachuck
Greenwood
Hartford
Kays
Vernon
McAfee
Lakeside
Kampe
Hamburg
West Milford
Franklin Furnace
Two Bridges
Glenwood
Ringwood
Ringwood Manor
Ringwood Iron Works
Skyline
Suffern
Spring Valley
Ramsey
Mahwah
New City
New City Jct.
Nyack
Pearl River
Orangeburg
Montrose
Piermont
Tappan Sea
Nanuet
Haverstraw
Garnerville
Congers
Valley Cottage
Nanuet
Tappan
Old Tappan
Oradell
Closter
Cresskill
Demarest
Tenafly
Englewood
Englewood Cliffs
Fort Lee
Edgewater
Weehawken
Hoboken
Jersey City
Bayonne
Kearny
Harrison
Newark
Elizabeth
Linden
Rahway
Carteret
Perth Amboy
South Amboy
Sayreville
Old Bridge
Matawan
Keyport
Union Beach
Belford
Middletown
Red Bank
Shrewsbury
Tinton Falls
Eatontown
Oceanport
Monmouth Park
Long Branch
Asbury Park
Ocean Grove
Neptune
Neptune City
Bradley Beach
Belmar
Lake Como
Spring Lake
Wreck Pond
Manasquan
Point Pleasant
Bay Head
Mantoloking
Brick
Lakewood
Toms River
Barnegat
Barnegat Light
Long Beach
Island Heights
Lakehurst
Whiting
New Egypt
Cassville
Jackson
Jackson Mills
Allenwood
Wall
Farmingdale
Adelphia
Freehold
Howell
West Freehold
Wayside
Hamilton
Glendola
New Bedford
Clarksburg
Georgia
Smithburg
Ardena
Sweetman's
Ely
Imlaystown
Red Valley
Cream Ridge
Davis's
Allentown
Robbinsville
New Sharon
Yardville
Hamilton Square
Trenton Junction
Ewing
Lawrenceville
Princeton Junction
Princeton
Plainsboro
Prospect Plains
Cranbury
Applegarth
Englishtown
Tennent
Colts Neck
Scobeyville
Tinton Falls
Farmingdale
Allaire
Squankum
Maxim
Southard
Allenwood
Wall
Lakehurst
Whiting
New Egypt
Cassville
Jackson
Jackson Mills
Lakewood
Toms River
Barnegat
Barnegat Light
Long Beach
Island Heights
Brick
Bay Head
Mantoloking
Point Pleasant
Manasquan
Spotswood
Helmetta
Wickatunk
Jamesburg
Lower Jamesburg
Hoffmans
Tylerdale
East Freehold
Millhurst
Manalapan
Pairdy
Perrineville
Elton
Adelphia
Smithburg
Ardena
Clarksburg
Georgia

Mau

proved land in farms. The famous sea-side resorts of the State fringe the coastal plain.

As set forth by Professor John C. Smack, the geologic structure of New Jersey is so related to the topography that observations concerning the physical features give a satisfactory clue to such structure. All of the larger geological formations of the United States, except coal, occur in parallel zones, as has been indicated. These formations extend from northeast to southwest, and a section line across the State from Port Jervis southeast to the ocean crosses them nearly at right angles to their trend. The oldest geological formations in the State are the crystalline rocks of the Highlands. Granite, gneisses, and other crystalline schistose rocks and beds of magnetic iron ore make up the mass of these mountain ranges. These rocks are generally much tilted in position, almost on edge, and are also much faulted. They strike northeast and southwest and dip to the southeast or northwest. The iron ores and zinc ores which are mined in the State are found in these formations. The granite, gneiss, and crystalline limestone or marble, used in building, are also from these Highland formations.

The Palæozoic rocks are found in the valleys included in the Highlands, in the Kittatinny Valley and Kittatinny Mountain, and in the Green Pond and Copperas Mountains. Cambrian, Silurian, and Devonian are represented, and the rocks are limestones, slates, sandstones, and silicious conglomerates. The magnesian limestones and the slates constitute wide belts in the Kittatinny Valley, the Musconetcong, Pohatcong, Pequest, and other valleys. The Kittatinny Mountain mass consists of sandstones and conglomerates of the Oneida and the Medina epochs of the Silurian age. In the valley of the Upper Delaware, west of this mountain, there are narrow belts of waterlime, Lower Helderberg, and Upper Helderberg, fossiliferous limestones, with Marcellus shale as the highest member of the Devonian within the State. The Green Pond Mountain rocks also have been referred to the Oneida horizon. The limestones and slates are the formations on which the rich wheat lands of Warren County and the dairy farms of Sussex are situated. Stone for building, slate for roofing and flagging stone, and limestone for lime and cement, are quarried in the Palæozoic areas. Copper, lead, and zinc ores, and barite, limonite, or brown hematite, and glass sand have been worked in many localities.

The red shales and sandstones and the included trap-rocks of the northern-central part of the State are referred to the Jura-trias of Mesozoic time. The sandstone beds dip in general toward the northwest, at a low angle of inclination in the sandstone. The erupted trap-rocks form long ranges of steep-sloping hills or mountains, often crescentic in form. A great deal of excellent sandstone for building and stone for road-making is quarried in this formation. Copper ores occur in the sandstone near the trap-rock or at their junction. Barite also has been mined in the sandstone at one locality.

The cretaceous rocks of the State include the clay district of Middlesex County and the greensand marl developed in Monmouth County, and thence southwest to Salem County. A large amount of clay is dug in the Raritan clay district. The greensand marl, dug in shallow pits generally, and in numberless localities, has had a wide use locally as a fertilizer.

The formations of the coastal plain zone, later than the cretaceous beds, are greensand marls of the Eocene, clays and sands of the Miocene, and the clays, sands, and gravels of the post-Tertiary. They are recognized in a fourfold division, and are known as Beacon Hill, Bridgeton, Pensauken, and Cape May formations. Clays and sands for brick, terra-cotta, and pottery, marls for fertilizer, glass sands, and gravel for road-building are dug in these formations.

In the northern part of the State there are surface formations of glacial epochs, and the terminal moraine of the last glacial ice is traced from Perth Amboy by Morristown and Hackettstown to Belvidere on the Delaware.

Alluvial deposits of recent time are recognized in the river valleys and in the tidal marshes and in some of the fresh-water swamps.

Economic Geology.— To the early settlers the mineral wealth of the State was well known. Before the Revolution, copper, "bog" iron, brick clay, and glass sand were exploited. At the present time, the copper ores are not worked, owing to their low grade. Copper is distributed throughout the red sandstone zone. Of the iron-mining industry, the magnetic iron ores form the basis. Of about 17 active iron mines, in 1900, the output amounted to about 342,000 gross tons, while the mines of limonite, or brown hematite, and of red hematite, are not worked.

The output of zinc, in 1900, amounted to 195,000 tons, the ores being red oxide, silicate, and franklinite. The zinc deposits of Ogdensburg and Franklin Furnace in Sussex County are the most famous, although other localities where zinc blende occurs have been exploited, but have not been developed into mines. Lead in the form of galena has been mined in Sussex County. Arsenical and nickeliferous pyrites also occur. Graphite is disseminated widely in the crystalline schistose rocks of the Highlands. Molybdenum occurs in form of molybdic sulphide at the Ogden mines and at the Hude mine, Sussex County, but is not worked. Barite has been found in quantity for mining near Newton, Sussex County, and at Hopewell, Mercer County.

Clays are found throughout New Jersey. There are numerous beds of fire-clay, stoneware or potter's clay, and clay used in the manufacture of paper, terra-cotta, pipes, and bricks. The district at the mouth of the Raritan River produces, for its own establishments and more distant points, a vast tonnage of fire and ware clay. The large openings are near Woodbridge, Perth Amboy, Sand Hills, South Amboy, Sayreville, and Cheesequake. Clays for ware and for terra-cotta are obtained at various points, notably near Trenton and at Palmyra. Fire-clays are found along the line of the New Jersey Southern Railroad, large works being located at Winslow.

Brick-earth, or brick-clay, is found in thick beds along the Raritan River and Raritan Bay, along the Delaware, on the Hackensack, and there are very large brickyards on these navigable tidal waters, which make a large part of the brick used in structural work in New York

and Philadelphia. Fire-sand, kaolin, and feldspar, as well as fire-clay, are also dug extensively in the Raritan clay district and put into fire-brick. The supply of glass sand in the coastal plain is practically inexhaustible.

Of building stone, granite has been quarried at Charlottenburg in Morris County, and Pochuck Mountain, in Sussex County. Gneisses, for heavy bridge work, are quarried at Dover. Sandstone quarries at Avondale, Newark, Paterson, Little Falls, Haledon, Stockton, and Greensburg, or Wilburtha, produce brownstone for cut work, while trap-rock, widely distributed and accessible to railroads and canals, has been most successfully used on State roads.

The marbles of the State are not at present worked, while slate for roofing has been quarried at the Delaware Water Gap, and at Newton and Lafayette in Sussex County. Flagging-stone quarries are opened near Deckertown in Sussex County; at Milford, on the Delaware, and at Woodsville in Mercer County. The Green Pond Mountain range also affords a flagstone. Limestone, suitable for the manufacture of Portland cement, is quarried extensively near Phillipsburg in Warren County.

Agricultural Interests.— The staple crops produced in New Jersey are corn, wheat, rye, oats, buckwheat, hay, white and sweet potatoes. The value of these products may be thus estimated: corn, $4,000,000; wheat, $2,000,000; rye, oats, and buckwheat, $1,600,000; hay, $8,000,000; white potatoes, $2,000,000; sweet potatoes, $1,250,000, or a total of $18,850,000. Of animals there are horses, mules, milch cows, other cattle and sheep. Horses are estimated to be valued at $7,600,000, mules $750,000, milch cows $9,000,000, other cattle $1,275,000, sheep $200,000, or a total of $18,825,000 for staple crops and stock, adding the product of milch cattle, about 360,000,000 quarts of milk, valued at $10,000,000, the total is nearly $50,000,000.

Possessing a great diversity of soils, and a somewhat notable variation in temperature, New Jersey has ever occupied a distinctive position as an agricultural community. The average yearly temperature ranges from 49.6° in the Highlands to 53.0° on the sea coast. The average annual precipitation, including melted snow, is 47.18 inches in the Highlands, and 45.92 inches on the sea coast. Aside from the staple crops, above mentioned, the fruits of the State have a large sale in the nearby markets of Philadelphia and New York. Peaches and apples are extensively grown in the northern and northwestern portions of the State, while pears are cultivated in the midland counties. These fruits are common, however, in all sections. The southern counties produce large acreages of strawberries, raspberries and blackberries, while cranberries are a staple product of boggy areas in Burlington and Ocean counties. Grapes are grown extensively in the southern section of New Jersey, while plums, cherries, and currants are common in all sections. Huckleberries are of spontaneous growth and are gathered in large quantities. In truck farming, watermelons and cantaloupes, the Hackensack variety of the latter competing with the Colorado product, are grown on the large plantations and small farms near Philadelphia and New York. Market gardening, owing to the reasonable price of land, and extensive stone-road system, and quick, cheap, and safe transportation by rail and boat, is a profitable industry in New Jersey, more particularly in the vicinity of New York. Commercial floriculture gives to the State a preeminence. Dairying is largely confined to the northern, central, and southwestern portions of the State. The poultry farms of New Jersey are near the markets of Philadelphia and New York. The forest lands, including stump and brush lands to merchantable timber, of the State occupy about 2,000,000 acres; the cleared farm land about the same acreage; 1,200,000 acres of forest land is coniferous, pitch pine on the uplands and white cedar in the swamps. This is the region known as the "Pines" extending from Lakewood on the north to Cape May County on the south, and embracing a number of health resorts. The northeastern Highlands, with 210,000 acres, the Kittatinny Mountain with 58,000 acres, the Palisade Mountain with 11,000, are the remaining large forest areas. The forest products are worth about $4,000,000 annually. Owing to a lack of interest and knowledge, an inherited desire to denude the surface of the earth and almost constant fires during dry seasons, the forests of New Jersey have been neglected and rendered unproductive to the last degree. During the colonial period, forest lands were not only of a relative but actually of a greater value than they are at present. The State renders directly and indirectly great assistance to agricultural interests by the media of an agricultural college located in New Brunswick, experiment stations, a board of agriculture, grange and horticultural society. Reports, institutes, and lectures are the means of disseminating information.

Manufactures.— The great manufacturing districts of New Jersey are located in the immediate vicinity of New York and Philadelphia. Within the limits of the city of Newark alone it is claimed there are made a wider variety of articles than in any other city in the United States. Newark is famous for leather, jewelry, hats, and celluloid, Paterson for silks and locomotives, Passaic for woolen and worsted goods, Jersey City for tobacco products and soap, Trenton for pottery of all grades, structural steel and iron and rubber goods, Camden for shipbuilding and chemicals, Elizabeth for sewing machines and shipbuilding, New Brunswick for hosiery, Perth Amboy and its vicinity for bricks and terra-cotta, Bridgeton, Millville, Vineland and smaller towns for glass. There are approximately 200,000 wage-earners in New Jersey, and the annual product of their labor is

	No. of establishments	Persons employed	Capital invested
Bricks and terra-cotta..	66	6,600	$ 7,000,000
Window and bottle glass	23	6,300	4,000,000
Men's felt and wool hats	51	5,500	2,000,000
Jewelry	65	2,700	3,000,000
Pottery	30	3,700	5,500,000
Leather	55	3,900	6,300,000
Shoes	48	4,900	2,300,000
Woolen and worsted goods	38	7,600	8,000,000
Chemical products.....	42	3,400	13,800,000
Refined oils and by-products	14	2,800	17,300,000
Silk	152	27,700	22,500,000

about $400,000,000. From reports obtained for 1900, the data as shown in the foregoing table is presented in round figures as to the 11 great industries of New Jersey.

Of the other industries, outside those of an agricultural and manufacturing character, the oyster and fish industry is most conspicuous. From the mouth of the Raritan River to Sandy Hook, from Barnegat Bay to Cape May and thence in Delaware Bay to Salem, are about 15,000 acres of productive oyster beds. From the famous Maurice River oyster beds alone $2,275,000 worth of these bivalves were shipped, exceeding in value the wheat crop of the State. From the Atlantic Ocean and Delaware Bay, vast quantities of clams, and fish of many kinds are sent to nearby markets. Shad and sturgeon, the latter furnishing caviare, are caught in Delaware Bay and river.

Transportation.— There are in New Jersey about 2,300 miles of railroad, with about 35,000 employees, whose duties are performed within the limits of the State. The railroad companies having trackage in the State are the Pennsylvania and the West Jersey and Sea Shore, representing about one third of the total miles of track. The remaining roads are the Central of New Jersey, Philadelphia and Reading, Erie, Delaware, Lackawanna and Western, New York, Susquehanna and Western, the Lehigh Valley and about 30 unclassified companies. Within the State are the two gateways, Jersey City and adjacent cities leading to greater New York and Camden to Philadelphia. All of the above companies have terminal facilities in Jersey City, Weehawken and Hoboken. Every railroad entering New York city from the west and south, except the New York Central, now lands its passengers in New Jersey. There are nearly 1,000 miles of cable, electric and horse railroad in the State, a large percentage of the trackage being under the control of the Public Service Corporation. A practically continuous trolley service has been established between Jersey City and Camden, uniting Philadelphia and Greater New York. These roads have cost nearly $150,000,000. In conjunction with the counties, townships, and cities and assessments upon abutting property owners, New Jersey has aided in the construction of 1,000 miles of good roads, penetrating every section of the State and usable at all seasons of the year. The canal systems of the State embrace the Delaware and Raritan, extending from Bordentown to New Brunswick, and the Morris, extending from Jersey City to Phillipsburg and uniting with the canal system of the commonwealth of Pennsylvania. The total mileage is 173.34.

State Institutions.— New Jersey has lately largely increased her activities in the matter of support of State institutions. That of a penal character is the State Prison located at Trenton. Those of a correctional character are the Reformatory for men and boys located near Rahway, the State Home for Girls near Trenton, and the State Home for Boys near Jamesburg. Those for dependents, defectives and delinquents are the State Hospitals for the Insane near Trenton and near Morristown, the Home for Feeble-minded Women and the Home for Feeble-minded Children (separate institutions) each located at Vineland, the State Village for Epileptics near Skillman and the School for the Deaf at Trenton, the latter being under the control of the State Board of Education. These institutions are under the administration of separate boards appointed by the governor of the State. New Jersey has not yet adopted the plan of a general board of supervision or control. In matters of education, the State sustains a Normal and Model School at Trenton, the Farnum Preparatory School at Beverly, Manual Training and Industrial School for Colored Youth at Bordentown, agricultural college and experiment station, and teachers' institutes and libraries. Other functions assumed by the State are the preservation of fish, game and oysters, the care of the lives of employees in factories and workshops, an extensive geological survey, the preservation of historic sites, of the Palisades of the Hudson River and of public documents, the removal of children from such improper influences as poor-houses, the prospective care of tuberculosis patients. For her soldiers and sailors and their wives New Jersey has established homes at Kearney and Vineland.

Seaside Resorts.— The diversified scenery and climate of the State has led to the establishment of many resorts in all parts of New Jersey. Along the sea coast, Cape May has been noted as such for about a century, to be soon followed by Long Branch. Atlantic City has had in 1904 an organized existence of 50 years and represents, in growth and attractiveness, the most conspicuous example of municipal sea-shore development to be found in the world. Asbury Park and Ocean Grove were established about 1870. Within the last quarter of a century, practically every foot of beach front from Sandy Hook to Cape May has been subjected to a greater or less degree of development. Of the mountain resorts, one hotel property at Schoaley's Mountain has entertained visitors for a century. Such lakes as Budd's, Hopatcong, and Greenwood are noted, while many hotels are to be found in the hilly country within easy access of New York. There are in the hills and mountains of the State, however, no communities devoted exclusively to furnishing amusement and health to visitors. In the "Pines" are a number of small resorts, all being overshadowed by Lakewood, the nearest point in the Pines accessible to Greater New York.

Education.— As early as 1662 a schoolmaster was settled among the Dutch land owners in what is now Jersey City; about 10 years later schools were erected in Newark, Woodbridge, Amboy, Elizabethtown, Freehold and Piscataway, while in 1683 the Society of Friends at Burlington set aside rents from an island in the Delaware, for the purposes of public education. In 1817, after nearly 20 years' agitation, the legislature created the first school fund. The management of the schools of the State is vested in a State Board of Education appointed by the governor. This board appoints superintendents for each of the 21 counties of the State. Although the Constitution requires that the State shall provide free instruction for all children between the ages of 5 and 18, the State has extended the age from 4 to 20. Courses in kindergarten and manual training have been extensively adopted, particularly in the large industrial centres.

The number of school-houses in the State is about 1,900, providing accommodations for

300,000 pupils. The value of the school property is $15,000,000.

There are enrolled in the public schools about 950 male teachers, at an average annual salary of $866, and 6,200 female teachers, at an average annual salary of $500.

There are enrolled in the public schools about 325,000, and in private schools about 50,000, making the total number of children in school about 81 per cent of the children in the State. Of the private schools in the State among the most conspicuous are Lawrenceville School (John C. Green Foundation), one of the most famous in the country, Princeton Preparatory School, Peddie Institute at Hightstown, Pennington Seminary, all in the county of Mercer. Other schools are St. Mary's Hall in Burlington, the West Jersey Academy and South Jersey Institute at Bridgeton, Newark Academy, Hasbrouck Institute at Jersey, Bordentown Military Academy, Blair Presbyterial Academy at Blairstown, Centenary Collegiate Institute at Hackettstown. There are theological institutions of the Reformed Church in America at New Brunswick, of the Presbyterian Church at Princeton, of the Methodist Episcopal Church (Drew Seminary) at Madison, the German Theological School at Newark and Seton Hall of the Roman Catholic Church. The three conspicuous colleges in the State are Princeton University, Rutgers College at New Brunswick and Stevens Institute of Technology at Hoboken.

Churches.— Throughout the colonial period of New Jersey three lines of religious activity were noticeable. In the eastern portion, the various phases of Calvinism were transplanted over-sea by the settlers. The Hollanders, the Scotch and many of the English emigrants, and the French Huguenots found a common bond of association in Calvinism. Ultimately Presbyterianism, outside of the sphere of Dutch influence, became dominant. In the western portion of the colony the Society of Friends held sway, with strength in Monmouth County, a part of the eastern portion. The Church of England never obtained a strong hold in the colony, its main congregations being at Burlington, Trenton, Perth Amboy, Elizabeth and Newark. During the middle part of the 18th century, Whitefield and Tennant, as Calvinists, and John Woolman, the apostle of the abolition movement in America, paved the way for future changes. Following the Revolution, the Methodist Episcopal Church, with its democratic teachings, recruited largely from the Society or Friends and from many of the Presbyterian congregations. With the coming of the Irish and German emigrants into New Jersey, in the period of extension of transportation systems (1830–60), the Roman Catholic Church made great advance.

Banks and Banking.— The State Legislature granted charters to two banks, one in Newark and one in Trenton in 1804. In 1812 a general banking law was passed for the protection of depositors, the law remaining in force until 1850, when other laws were passed. There were eight banks of issue in 1860. In 1868 there were 55 national banks in the State, 115 in 1900, and 124 in 1901. In the last named year there were 18 State banks. The Legislature established a department of banks and insurance in 1891, and the banking law was again revised in 1899. Since 1880 New Jersey has been a favorite State for trust companies and for the organization of large corporations. Savings banks were first established in 1828. In 1876 a law was passed regulating these institutions. In 1902 the condition of the New Jersey banks was thus summarized:

	No.	Capital	Surplus
National banks	124	$17,164,000	$11,375,000
State banks	18	1,503,000	979,000
Savings banks	28	.....	6,060,000
Trust companies	47	9,321,000	6,890,000

Finances.— The finances of the State are in most excellent condition, there being no bond issues for which interest and a sinking fund must be provided, nor is there a State tax levied. The total receipts of the State at the close of the fiscal year ending 31 Oct. 1903 amounted to $4,692,845.07. Of such total receipts $3,088,034.80 was derived from the tax on railroad and miscellaneous corporations, being about three fourths of the total revenue. Other important sources of revenue are State fees from the offices of the clerks in chancery and supreme courts, the collateral inheritance tax, from the office of commissioner of banking and insurance, from the office of Secretary of State (fees for filing certificates of incorporation), from the State Prison and State Reformatory and from the oyster commission. During the fiscal year of 1903 the disbursements of the State amounted to $4,485,926.16, leaving a balance of $206,918.91. The school fund represents an annual amount of nearly $2,500,000, the elements of receipts being a State school tax, interest on stocks and bonds, rents from riparian leases and real estate, licenses.

Population.— New Jersey began to obtain rapid growth in population about the year 1840; the absolute increase being the greatest in the decade from 1890 to 1900, due largely to the immigration of foreigners and the suburban New York population. The growth of population is given by the government census as follows: (1790) 184,139; (1820); 277,426; (1850) 489,555; (1860) 672,035; (1870) 906,096; (1880) 1,131,116; (1890) 1,444,933; (1900) 1,883,669. In 1900 there were 431,884 residents of foreign birth, one half of which number were German and Irish. There were in the same year 69,844 negroes in the State. There are 250 people to the square mile, and 67 per cent of the total population reside in 49 cities of over 4,000 population each.

The largest cities in the State with their population for 1900 and 1890 are as follows:

	1900	1890
Newark	246,070	181,830
Jersey City	206,433	163,003
Paterson	105,171	78,347
Camden	75,935	58,313
Trenton	73,307	57,458
Hoboken	59,364	43,648
Elizabeth	52,130	37,764
Bayonne	32,722	19,033
Atlantic City	27,838	13,055
Passaic	27,727	13,028
Orange	24,141	18,844
New Brunswick	20,006	18,603

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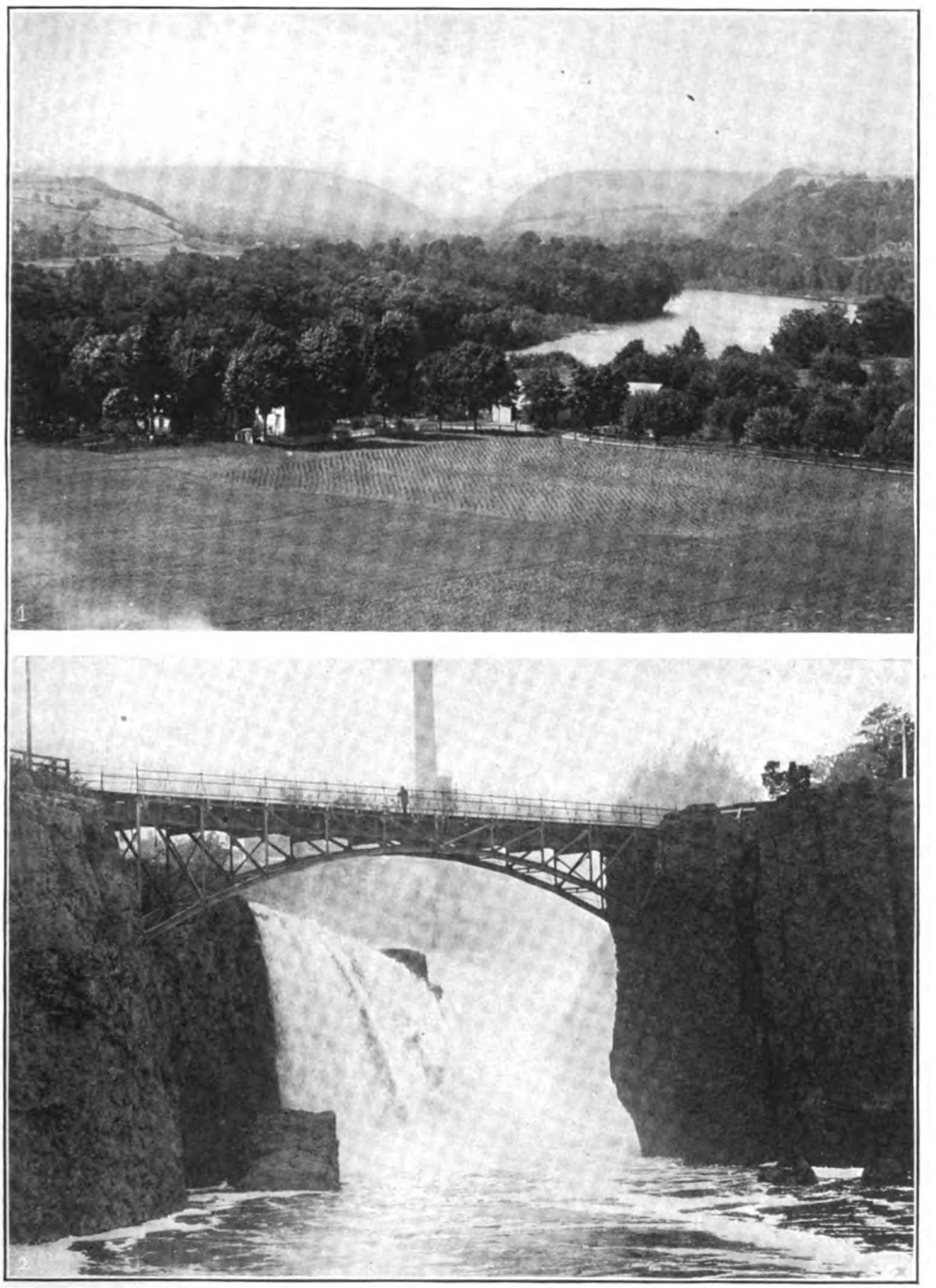

1. Looking toward the Delaware Water Gap from Manunka Chunk.
2. Falls of the Passaic, Paterson.

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Following is a list of the counties in New Jersey with their population for 1900 and 1890:

County	Square Miles	1900	1890
Atlantic	567	46,402	28,836
Bergen	236	78,441	47,226
Burlington	869	58,241	58,528
Camden	222	107,643	87,687
Cape May	256	13,201	11,268
Cumberland	511	51,193	45,438
Essex	127	359,053	256,098
Gloucester	326	31,905	28,649
Hudson	43	386,048	275,126
Hunterdon	437	34,507	35,355
Mercer	226	95,365	79,978
Middlesex	312	79,762	61,754
Monmouth	479	82,057	69,128
Morris	475	65,156	54,101
Ocean	583	19,747	15,974
Passaic	198	155,202	105,046
Salem	359	25,530	25,151
Somerset	305	32,948	28,311
Sussex	529	24,134	22,259
Union	103	99,353	72,467
Warren	362	37,781	36,553
Total	7,525	1,883,669	1,444,933

Government.— The general government of the State is administered under a Constitution adopted by the people in 1844, and in 1875 amended by a special election. Amendments to become a law, or a part of the Constitution, must receive the approval of the majority of the members of two consecutively chosen legislatures of the State, and must then be submitted to the people. A majority vote of the electors of the State is necessary for adoption. Five years is the time that must elapse between the submission of amendments to the people. Duly qualified voters are male citizens who have resided in the State one year, and in the county five months. The law requires the registration of voters. State elections are held annually on the Tuesday after the first Monday in November. The State has 10 representatives in the Lower House of Congress.

Legislature.— There are 21 State senators composing the Upper House of the Legislature, one from each county, and the term of office is three years. There are 60 members of the House of Representatives, elected from the counties on the basis of population. The term of office of a member of the Lower House is one year. Revenue bills originate in the Lower House.

Executive.— The governor is chosen by popular vote and for a term of three years. He cannot be re-elected without an intervening three years. He has power to call extra sessions of the Legislature, or of the Senate without the Representatives. He has the usual veto power which may be overruled by a majority vote of all the members of the Legislature. He grants pardons and reprieves in conjunction with the chancellor and six judges of errors and appeals. The state treasurer and comptroller are appointed for three years at a joint session of the Legislature. The governor, subject to the approval of the Senate, appoints for terms of five years the secretary of state, attorney-general, clerk of supreme court, clerk of the court of chancery, and keeper of the State prison.

Judiciary.—New Jersey has courts of law and courts of equity. The chancellor of the State and the judges of the supreme court are appointed by the governor, subject to approval by the Senate, for terms of seven years. The courts are supreme court, county courts, orphans' court, and court of general quarter sessions of peace. The chancellor, the justices of the supreme court, and six judges specially appointed, constitute the court of errors and appeals. The Senate tries cases of impeachment.

Local Government.—The counties and towns are governed under general laws, and special laws cannot be passed unless by amendment of the Constitution. The justices of the peace are elected for five years by vote of the electors of the townships. The counties elect surrogates and clerks for terms of five years. The counties elect, also, sheriffs and coroners for three years, but such officers cannot be re-elected without an intervening three years. The cities and townships are required to have local boards of health.

History.— Based upon the conclusions reached by a group of scientists of international reputation, it may be stated that Man, known as "Glacial," "Argellite," and "Palæolithic," resided within the limits of New Jersey, at the close of the Age of Ice. The proofs offered are the presence of non-intrusive stone implements, remains of extinct quadrupeds, used by primitive man as food, and human skulls and bones, all of which have been found in and near the city of Trenton. At this point, a large deposit of river wash, particularly sand and gravel, indicates that at one time the mouth of the Delaware River was directly south of Trenton. In the river wash the above mentioned evidences of human occupancy have been found. The culture point attained by these earliest inhabitants was probably that reached by Man in the Stone Age in Europe.

The Indians whom the Dutch and Swedes found in New Jersey were known as the Lenni-Lenapé, members of the great Algonquin family. They were comparatively few in number, scattered in shifting communities along the river valleys and the sea coast. Less warlike than the Indians of New England or of Virginia, the Lenni-Lenapé, later known as the Delawares, made some progress in agriculture and in the elementary arts. With the Dutch and Swedes, the Indians maintained comparatively peaceful relations, although a traders and settlers' war in the Raritan Valley, before the coming of the English, is a matter of record. After the English conquest of 1664, the Indian, although kindly treated by the Society of Friends in West Jersey, and tolerated by the Calvinists in East Jersey, could not withstand the effects of European civilization. Consumption, smallpox, venereal diseases, and alcoholism drove him down to the depths. Distrustful of the efforts made by the missionaries, his personal liberty restrained by legislation and social custom, the Indian was enslaved, and by intermarriage with the negro, lost his identity. In 1758, most of the New Jersey Indians were removed to the first reservation ever established within the limits of the present United States — that located at Edgepelick, Brotherton, or Indian Mills in the "Pines" of Burlington County. At the opening of the 19th century the Indians were removed to New York, and thence after various wanderings to Indian Territory. Lenni-Lenapé of the full blood are now extinct in New Jersey.

Holland, politically and religiously free, and

struggling with Sweden for supremacy as a world power, located upon Manhattan Island, her principal fort and trading post in the New World. Her navigators explored the coasts of New Jersey, and to one of the great rivers, the North, was given the name of Hudson. Cornelius Jacobsen Mĕy sailed up the Delaware, then known as the South River, and commemorated himself by the name Cape May. By discovery and occupancy Holland laid claim to the soil of New Jersey. From New Amsterdam, farmers and traders established themselves in what is now Hudson and Bergen counties. By 1650 colonists had penetrated the river valleys emptying into all the waters of the Greater New York Harbor. Settlements were attempted on the Delaware. The efforts of the Dutch, in the colonization of New Jersey, were only successful in the northeastern portion of the State, where the church, speech, and lines of political thought of the fatherland firmly impressed themselves upon the community until recent years.

Gustavus Adolphus, in his scheme of Swedish colonization for North America, utterly disregarded the presence of the Dutch in New Jersey. For about 15 years after 1640, several groups of Swedish settlers occupied the valley of the Delaware, locating principally in the vicinity of Philadelphia. The communities of Swedes in New Jersey, isolated, and neglected by the home government and harassed by the Dutch, finally submitted, with their associates in Pennsylvania and Delaware, to the domination of Holland. From 1655 to 1664, New Jersey remained under the absolute control of Holland.

Recognizing the fact that Dutch control of the valleys of the Hudson and the Delaware separated New England from the southern colonies, Charles II., king of England, granted to his brother, James, Duke of York, a vast domain in North America, including much of what is now New England, New York, and New Jersey. An English naval expedition, in the summer of 1664, sent to New Amsterdam, secured the capitulation of the Dutch. To John, Lord Berkeley and Sir George Carteret, two faithful adherents of the House of Stuart during the Protectorate, the Duke of York made a transfer of what is practically the territory of New Jersey.

In recognition of Carteret's defense of the island of Jersey, against the Cromwellian forces, the Berkeley-Carteret grant was called *New* Jersey. The policy of the proprietors was to attract settlement, which was accomplished by exploiting the natural advantages of the colony, granting a liberal frame of government and providing for allotments of free or low-priced land. There was a very pronounced New England movement into the valleys of the Passaic and smaller streams, and by the introduction of social, political and religious views of the Congregationalists, the eastern portion of the colony became a partial reproduction of New England itself. Within a few years Berkeley disposed of his interests to a company largely composed of members of the Society of Friends. A partition being desirable, a line was run from Little Egg Harbor to a point near the Delaware Water Gap. Henceforth, after 1676, begins the political history of East and West Jersey. To Carteret fell East Jersey; while West Jersey became the property of the members of the Society of Friends. After 1676, the western portion of the State was open to English settlement, the dominant spirit being William Penn. The communities established in the Delaware river valley were isolated, and a plantation life, not unlike that of Virginia and Maryland, lacking certain religious characteristics, was developed. The county in West Jersey became the political unit, as the town became the political unit in East Jersey. Both the Jerseys passed later under the domination of Boards of Proprietors, who exercised broad governmental powers, and, until the present, held title to unoccupied lands. From 1664 to 1702, when both boards relinquished governmental rights to the Crown, there was a constant spirit of popular unrest, and one complete and one attempted change in government. In 1673 New Jersey was recaptured and occupied for a few months by the Dutch. When James, Duke of York, became King James II., he endeavored, by means of Sir Edmund Andros, to upset the proprietary governments, the matter not being finally settled, favorably to the proprietors, until 1681. In the meantime, internal disturbances growing out of quit-rent agitations, affected the peace of the two proprietaries. The period from 1702 to the outbreak of the American Revolution was undisturbed by any dramatic incidents. The growth of Philadelphia and New York, as commercial centres, tended to develop the agricultural interests of New Jersey. As early as 1710 the tendency to draw the active forces of the colony into the two cities was apparent, leading to Benjamin Franklin's famous aphorism, uttered soon thereafter, that New Jersey was like a cider barrel, tapped at both ends. The usual colonial quarrels between the Crown officers and the popular branch of the legislature were reflected in New Jersey, as elsewhere. Landed interests dominated the governor's council, small property owners were disfranchised, business enterprises were restricted, if not prohibited, by legislation in Parliament, and by taxation, commerce on the high seas was suppressed by the Navigation acts, metallic currency was withdrawn from the colony,—a score of causes, mainly economic, operated to produce the resort to arms.

While loyal to the Crown, there were, nevertheless, mutterings of discontent, of ill-concealed defiance of law officers and a spirit of restlessness, restrained by the wave of patriotism evoked by the French and Indian war, but which swept on with increasing force after the opening of the year 1770. The most notable events of this period, from 1702 to 1775, were the suppression of piracy in the vicinity of New York and Cape May; the establishment of a continuous land and water route from Philadelphia and New York; the erection of ferries and post roads; the appearance, in the northern, central and western parts of the colony, of Huguenot, Scotch-Irish and Palatinate emigrants; the chartering of Princeton University and Rutgers College; the establishment of the first Indian reservation in the United States in Burlington County, the religious revival of George Whitefield, and the promulgation of John Woolman's abolition doctrine; the massacres by the Indians in Sussex County, and the erection of a series of barracks, owing to their need in the French and Indian war, in various parts of the State. The open-

ing of the American Revolution found New Jersey divided in sentiment. The Calvinistic element, represented so largely in East Jersey, took the initiative. The spirit of war, as in New England, appeared in the town meeting. The professional classes, the members of the Society of Friends, and the large merchants were either opposed to war or were non-combatants. A minority awaited the results of agitation. The strength of the element loyal to the home government may be shown from the fact that upon 2 July 1776, when New Jersey asserted her statehood, the Constitution contained a proviso that the document should not be operative in case of a reconciliation between England and New Jersey. William Franklin, the last colonial governor of New Jersey, remained loyal to the Crown, and, banished from New Jersey, sought refuge among Tory sympathizers in New York city, becoming the adviser of those planning movements of Tory invaders in the State. Largely conducted in the northern central portion of New Jersey, under the control of Crown sympathizers, these raiders gained the name of «Pine Robbers.» During the Revolution, nearly 100 battles and skirmishes were fought upon the soil of the State. Most conspicuous were the battles of Trenton (26 Dec. 1776), Princeton (3 Jan. 1777), Red Bank (22 Oct. 1777), Monmouth (28 June 1778), and Paulus Hook (19 Aug. 1779). Among minor engagements of importance were the fights at Bound Brook (13 April 1777), Egg Harbor (15 Oct. 1778), Hancock's Bridge (21 March 1778), Tom's River (24 March 1782), the burning of Bordentown (8 May 1778), and no less than a score of engagements in and around Elizabeth and Newark and nearby territory. During the war occurred the «retreat across the Jerseys» and Washington's two winter occupations of Morristown. At the close of the war, New Jersey was sadly impoverished. Her spirit was distinctively Federal. She participated in the Annapolis Convention, her representatives advocated the «New Jersey plan» at Philadelphia, in the framing of the Federal Constitution, which she adopted without a dissenting voice. With the opening of the 19th century, New Jersey became a political storm-centre. As a Federalist leader, Alexander Hamilton had wielded a powerful influence in the State. He had been active in the establishment of the Society for the Improvement of Useful Manufactures, out of which grew the city of Paterson, and had urged the development of Paulus Hook (the site of Jersey City). He was closely allied with the Federal elements until then in control of New Jersey politics. Arrayed against him was Aaron Burr, son of the Rev. Aaron Burr, sometime President of the College of New Jersey, now Princeton University. The end of the antagonism between Burr and Hamilton came in a duel fought in 1804, at Weehawken, New Jersey. The activities in politics were reflected in industrial life. Before the second war with England, a chain of State banks was established, bridges crossed the rivers between Philadelphia and New York, steamboats were to be found upon the Delaware and Hudson rivers, highways were extended to every accessible part of the State, and the development of water-power led to the establishment of many small factories. The second war with England blighted the prospects of growth. Although no engagements occurred upon her soil, New Jersey, as much for the protection of Philadelphia and New York, as for her own interest, furnished militia to garrison forts on the Delaware and at Sandy Hook. The position of the State led to overland transportation of military supplies between the North and South, for the reason that the Atlantic seaboard was blockaded by British fleets. From this condition and owing to the demand for good roads, the first railroad charter ever granted in the United States passed the Legislature in the year 1815. This, in connection with the revival of agitation concerning internal waterways, led to the constructing of the Camden and Amboy railroad and the Delaware and Raritan canal, now a part of the standard lines of the Pennsylvania Railroad system across the State of New Jersey.

The development of the industrial era, following the close of the War of 1812, broken by the panics of 1817, 1837, and 1857, marked the growth of Newark, Jersey City, Paterson, Elizabeth, New Brunswick, Trenton, and Camden. The period of social unrest characteristic of Jacksonian dominancy in politics led to the adoption of a new State constitution in 1844, pronounced reforms of a penalogical and charitable character, the extension of the public school system and the growth of railroads. The Civil War found New Jersey ready to respond to the call for troops. To the cause of the Union she furnished 88,305 men, or within 10,501 of her entire militia, and for the organization, subsisting, supplying, supporting and transporting her troops she paid nearly $3,000,000. Following the war came a period of prosperity. The agricultural advantages of the southern portion of the State, first practically promoted at Vineland and latterly fully disclosed by the success of the Jewish settlement at Woodbine, revolutionized a large area south of Camden. The overplus of population of Philadelphia and New York sought permanent and temporary homes in New Jersey, while the industrial centres of the northern and eastern portions of the State grew with unprecedented rapidity. The present prosperity of the State is largely due to the changes which have occurred in the last three decades.

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Editor-in-Chief of 'New Jersey as a Colony and as a State.'

New Jersey, College of. See PRINCETON UNIVERSITY.

New Jersey Foreigners, in American humor, an allusion to New Jersey as a foreign country, and to New Jerseymen as foreigners; a saying handed down from the time when Joseph Bonaparte, ex-king of Spain and Naples, after the downfall of Napoleon, sought an asylum in the United States. As an alien he was obliged to obtain a special act of Legislature to enable him to hold real estate. Pennsylvania refused, but New Jersey consented, and he established himself in princely magnificence at Bordentown. Hence men of other States used to declare that the Jerseymen, with their foreign prince, were foreigners.

New Jersey Plan, in American history, a plan for a Federal Constitution proposed at the Convention of 1787 by William Paterson, of New Jersey. The resolution provided for the enlargement and correction of the Articles of Confederation; that Congress should remain a single body, and should regulate taxation and commerce, and should choose the executive; that requisitions from States should be continued; that a judiciary should be established; that naturalization should be uniform; that the executive should coerce refractory States or individuals, and other provisions of less importance. This plan was unfavorably reported from the committee to whom it was referred.

New Jersey Tea. See CEANOTHUS.

New Jerusalem, je-roo'sa-lĕm, the name given by the Apostle John in the Book of Revelation to heaven.

New Jerusalem, Church of the. See CHURCH OF THE NEW JERUSALEM.

New Ken'sington, Pa., borough, in Westmoreland County; on the Allegheny River, and on a division of the Pennsylvania railroad; about 15 miles northeast of Pittsburg. It is in a region noted for the manufacture of iron and steel. Its chief manufactures are steel and iron products, flour, lumber, brick, beer, and furniture. The glass and white lead works in the vicinity contribute to the industrial prosperity of the borough. Pop. (1900) 4,665.

New Leb'anon, N. Y., town, in Columbia County; on the Chatham & Lebanon Valley railroad. The town includes several villages; Mount Lebanon, a Shaker village (see SHAKERS); Lebanon Springs, a noted summer resort. The town is in an agricultural section, but has some manufacturing interests. The chief manufactures are glass, brooms, baskets, flour, lumber, patent medicines, barometers, and thermometers. Pop. (1890) 1,765; (1900) 1,556.

New Leinster, lēn'stėr or līn'stėr. See STEWART ISLAND.

New Lexington, lĕk'sĭng-tŏn, Ohio, village, county-seat of Perry County; on the Cincinnati & M. V., and the Toledo & O. C. R.R.'s; about 50 miles east by south of Columbus. It is in an agricultural section, and in the vicinity are coal fields and deposits of fire clay. The manufactures are chiefly brick and other clay products. There is considerable trade in farm products, brick, clay, and coal. It is the seat of Saint Aloysius Academy. Pop. (1890) 1,470; (1900) 1,701.

New Light, a fish. See CRAPPIE.

New Lon'don, Conn., city, port of entry, one of the county-seats of New London County; on the Thames River, and on the Central V., and the New York, N. H. & H. R.R.'s; about three miles from Long Island Sound and 50 miles in direct line southeast of Hartford. It has regular steamer connection with New York and all the Sound ports. Its fine harbor is protected by Forts Griswold and Trumbull.

In 1646 John Winthrop, the younger, founded Naumeag, and in 1658 the name was changed to New London. Prior to the Revolution it was of considerable commercial importance and had established trade with the coast towns of the nearby colonies and with the West Indies. During the war it suffered from attacks by the British. On 6 Sept. 1781 a British force under command of Benedict Arnold attacked the town, destroyed the wharves and many of the buildings, and killed a number of the people. In memory of this attack, a shaft 127 feet high has been erected at the place (see GROTON) where the massacre occurred. The town was incorporated in 1784. The first session of the Catholic Summer School of America (q.v.) was held in New London.

New London has a number of large manufacturing establishments, chief of which are machine shops, foundries, printing-press works, silk-mills, cotton-gin factory, woolen mills, bed-quilt factory, furniture factory, and ship-yards. Sealing and whaling continue to be of importance, and a considerable amount of farm products are exported. It is a distributing centre for a large amount of the imports used in the southeastern part of the State. Some of the historic places of interest are the Old Town Mill, built in 1646, the school house where Nathan Hale was once a teacher, and the Hempstead House. A government naval station is on the river outside the city limits. The Thames River is a favorite stream for college boat races. A railroad drawbridge, opened in 1890, spans the river at New Haven. The parks, Williams, Memorial, and Boulder, are most attractive, and White Beach is a favorite bathing place. The prominent edifices are the city buildings, the churches, schools, and libraries. It has public and parish schools, the New London County Historical Society and Library, and a public library. The government is administered under a charter of 1894 which provides for a mayor, who holds office three years, and a council. The school board is chosen by popular vote. Pop. (1890) 13,757; (1900) 17,548. Consult: 'Historic New London,' in 'New England Magazine,' Vol. V.; Caulkins, 'History of New London'; Starr, 'Centennial Sketch of New London.'

New Mad'rid, Mo., city, county-seat of New Madrid County; on the Mississippi River, and on the Saint Louis Southwestern railroad; about 130 miles in direct line south by east of Saint Louis and about 50 miles below Cairo, Ill. It has regular steamboat connection with all the river ports. It was settled by Americans in 1788, when the Spanish owned east of the Mississippi. During the Civil War it was used as a Confederate station until 14 March 1862, when it was abandoned and became a Federal possession. It is situated in a productive agricultural region in which the principal crops are cotton, grain, and fruit. It has extensive lum-

ber interests. The trade is chiefly in lumber, grain, fruit, live-stock, and cotton. Pop. (1890) 1,193; (1900) 1,489.

New Market, Battle of. In co-operation with Gen. Grant's Wilderness campaign and the movements of Gen. Crook, who was marching from West Virginia on Staunton, Va., Gen. Sigel, commanding the Union forces in the Shenandoah Valley, on 9 May 1864, marched from Martinsburg up the Valley pike with Gen. Sullivan's division of infantry, Gen. Stahel's division of cavalry, and five batteries of artillery, in all about 6,500 men and 28 guns. He arrived at Woodstock on the 11th, his cavalry pushing on to Mount Jackson, where, on the 14th, it encountered some of Imboden's cavalry, forced it across the Shenandoah, and followed as far as New Market. Col. Moor with parts of Sullivan's division and cavalry, joined the advanced cavalry at New Market late in the evening, and a skirmish ensued, in which artillery was used. Twice during the night strong demonstrations were made on Moor, which he repulsed. Gen. Breckinridge, commanding the Confederate troops in the valley, hearing of Sigel's advance, had collected at Staunton a force of 5,000 men, including the cadets of the Virginia Military Institute, with eight guns, and at daylight of the 15th drew up two miles south of New Market to give battle. Moor had, beside 300 cavalry and two guns, two regiments of his own brigade and two of Col. Thoburn's. Stahel came up in the morning and took command, and as it neared noon Sigel arrived with the rest of his army, and made disposition for battle. Moor was left in his advanced position, with his own two regiments and a small body of cavalry to hold Breckinridge in check, until Sigel could complete his dispositions, which were well made. Thoburn's brigade constituted the main line, along which were the batteries. The cavalry was behind the centre and on the left flank. The line extended across the pike on rising ground, another slope in front being held by Moor, Breckinridge formed line with Echols' brigade on the right and Wharton's on the left, the Institute Cadets and the 62d Virginia between the two. Imboden's cavalry and a six-gun battery were on the extreme right. McLaughlin's artillery occupied a sharp ridge left of and parallel to the pike and opened furiously upon Sigel's guns, which as furiously responded. Breckinridge advanced, and Moor, being overlapped on both flanks, fell back in some disorder, and Breckinridge, without pausing, pressed on and attacked Thoburn, who, charging from his right, checked him, Sigel's guns using shell and canister with great effect. Meanwhile Imboden crossed Smith's Creek and, moving down its east bank, gained the top of a small hill opposite Sigel's left, placed his guns on it, and at short range opened a rapid fire upon Sigel's massed cavalry, which immediately fell back, and Sigel ordered his entire line to fall back half a mile. Imboden's guns were now turned on the flank of the infantry, Breckinridge pressed on in front, and the contest was desperate and at close quarters, Von Kleiser's battery being particularly destructive to the centre of Breckinridge's line held by the Cadets. An order to charge the battery was given, the Cadets and the 62d Virginia went forward in fine style, and with great loss captured the battery; the rest of the line advanced, and Sigel retreated, followed a short distance by Breckinridge. At Rude's Hill, nearly three miles from the field, Sigel halted and formed line; Breckinridge soon came up; there was an exchange of artillery firing; and at 7 P.M. Sigel abandoned Rude's Hill, crossed the Shenandoah, burned the bridge, and continued his retreat down the valley to Cedar Creek, which was reached early in the morning of the 17th. The Union loss was 93 killed, 552 wounded, and 186 missing. The Confederate loss was 42 killed, 522 wounded, and 13 missing. Consult: 'Official Records,' Vol. XXXVII.; Pond, 'The Shenandoah Valley in 1864'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV.; Wise, 'The Battle of New Market.'

E. A. CARMAN.

New Mecklenburg, měk'lĕn-bėrg, formerly NEW IRELAND, the second largest island of the Bismarck Archipelago (q.v.) to the northeast of New Pomerania, from which it is separated by Saint George Channel. It has an estimated area of nearly 5,000 square miles; with the exception of a small European trading station on the north coast it is inhabited by wild Papuan tribes.

New Mexico, a territory of the United States (Western or Pacific group), between lat. 31° 20′ and 37° N., and lon. 103° and 109° 2′ W.; bounded on the north by Colorado, on the east by Oklahoma and Texas, on the south by Texas and Mexico, and on the west by Arizona. Area, 122,460 square miles (78,374,400 acres), of which two thirds are public lands. Organized 25 Nov. 1850, under act of 9 Sept. 1850. Pop. (1890) 153,593; (1900) 195,310, or about 1.6 to the square mile. Capital, Santa Fé.

Topography.— New Mexico occupies a lofty plateau which reaches its greatest elevation in the north and west and slopes to the south and to the southeast, where lies the western part of the Llano Estacado, or staked plain, no part of the plateau being less than 3,000 feet above sea-level. The altitude of Santa Fé, in the north, is 6,998 feet, that of Albuquerque on the Rio Grande, near the middle of the Territory, 5,008 feet, while Carlsbad (formerly Eddy), on the Rio Pecos, is 3,122 feet. From the vast table-land, both east and west of the Rio Grande, rise numerous sierras and more or less isolated peaks belonging to the Rocky Mountain system. The Sangre de Cristo range of Colorado extends southward into New Mexico to lat. 35° 30′, the various component ridges being the Culebra, Cimarron, Taos, Santa Fé, Mora, Las Vegas, Raton, etc. The principal peaks are Cerro Blanco (14,269), Truchas (13,150), Taos (13,145), Costilla (12,634), Baldy (12,623), Lake (12,380), and Mora (12,020). Southward from these and extending eastward are numerous isolated sierras — the Sandia, Manzano, Gallinas, Jicarilla, Caballo, Oscuro, San Andres, Organ, Blanca, Capitan, Sacramento, Hueco, Guadalupe, and many lesser mountains. West of the Rio Grande and within its immediate drainage is another broken sierra, extending southward from the Colorado line, its principal component groups being the Petaca, Valles, Gallinas, Nacimiento, Jemez, San Mateo, Magdalena, Socorro, Black, Mimbres, Florida, and Potrillo mountains. In the northwest the Carrizo, Tunicha, and Choiska mountains, forming

part of the continental divide, extend into the Territory from Arizona, as do the San Francisco and Peloncillo ranges in the southwest; while lying between the western boundary and the mountains of the Rio Grande area are the Zuñi, Datil, Little Diablo, Black, Tularosa, Mogollon, Pinos, Burro, Pyramid, Big Hatchet, Hacheta, and Animas ranges, with many others of lesser note.

Rivers.—The streams of northeastern, eastern, and central New Mexico flow into the Mississippi and the Gulf of Mexico, while those of the western portion empty into the Gulf of California. The largest river is the Rio Grande, which flows generally southwesterly from the Colorado boundary to lat. 33°, then southeasterly across the Mexican line. This river has several unimportant tributaries within the Territory — the Chama, Jemez, and Rio Puerco from the west and several of even less significance from the east. The Pecos has its source in the Las Vegas Mountains, flows southeasterly, then generally southward, almost paralleling the western escarpment of the staked plain, and southeasterly across the Texas border, finally joining the Rio Grande. The Canadian, with its several headstreams, drains northeastern New Mexico and passes out of the Territory in lat. 35° 25', forming a branch of the Arkansas. The western part is drained entirely by headwaters of the Colorado — the San Juan, the Zuñi, and the Gila. The Rio Mimbres, which heads in the Florida Mountains, is, like all except the largest streams, non-perennial, and indeed even the channel of the lower Rio Grande is frequently dry.

Forests.— Several of the mountain ranges, particularly those of the north and in Lincoln and western Socorro, Grant, and McKinley counties, are covered with timber, the most valuable being pine, although oak, juniper, cedar, birch, maple, and other trees are common. The Pecos River, Lincoln, and Gila River forest areas have been reserved by the United States, but grazing of cattle is allowed under certain conditions. Piñon and cedar are abundant in the foot-hills throughout the Territory; mesquite is found in the southeastern part, east of the Pecos, while the saguaro or giant cactus forms a feature of the landscape in the southern and southwestern parts, where there are also groves of oak and walnut. Along all the watercourses cottonwoods are abundant, and occasionally willows and sycamores are found. Yucca, the roots of which are used as a substitute for soap, is everywhere abundant.

Agriculture.— In many of the valleys and mountain ranges (where the latter are not of exposed basalt) are nutritious grasses — at least 14 varieties, mostly gramma, being found — affording fairly abundant food for the large flocks and herds. Bear, deer, mountain lions, wildcats, and antelope elk are found in the mountains, and rabbits, hares, coyotes, and prairie-dogs are common in the plains. The valley lands are fertile, but as the Territory lies within the arid region, agriculture is conducted largely through irrigation, the irrigated farms forming 74.1 per cent. Much of the water diverted from the streams is wasted by crude methods, and as yet no reservoirs for the conservation of storm water have been constructed. It is estimated that the drainage area of the Pecos River within the Territory alone is susceptible of irrigating 13,000,000 acres of excellent land, or 250 per cent more than the aggregate of farm lands now in the entire Territory. By reason of recent congressional action in providing, by means of reservoirs, for the reclamation of the public lands of the arid region, however, agriculture in New Mexico will doubtless be greatly increased in the next few years. While possessing important mineral resources, New Mexico is pre-eminently an agricultural country, 41 per cent of the 66,396 persons pursuing gainful occupations being engaged in farming and stock-raising. The following table shows the acreage, yield, and value of crops in 1889 and 1899:

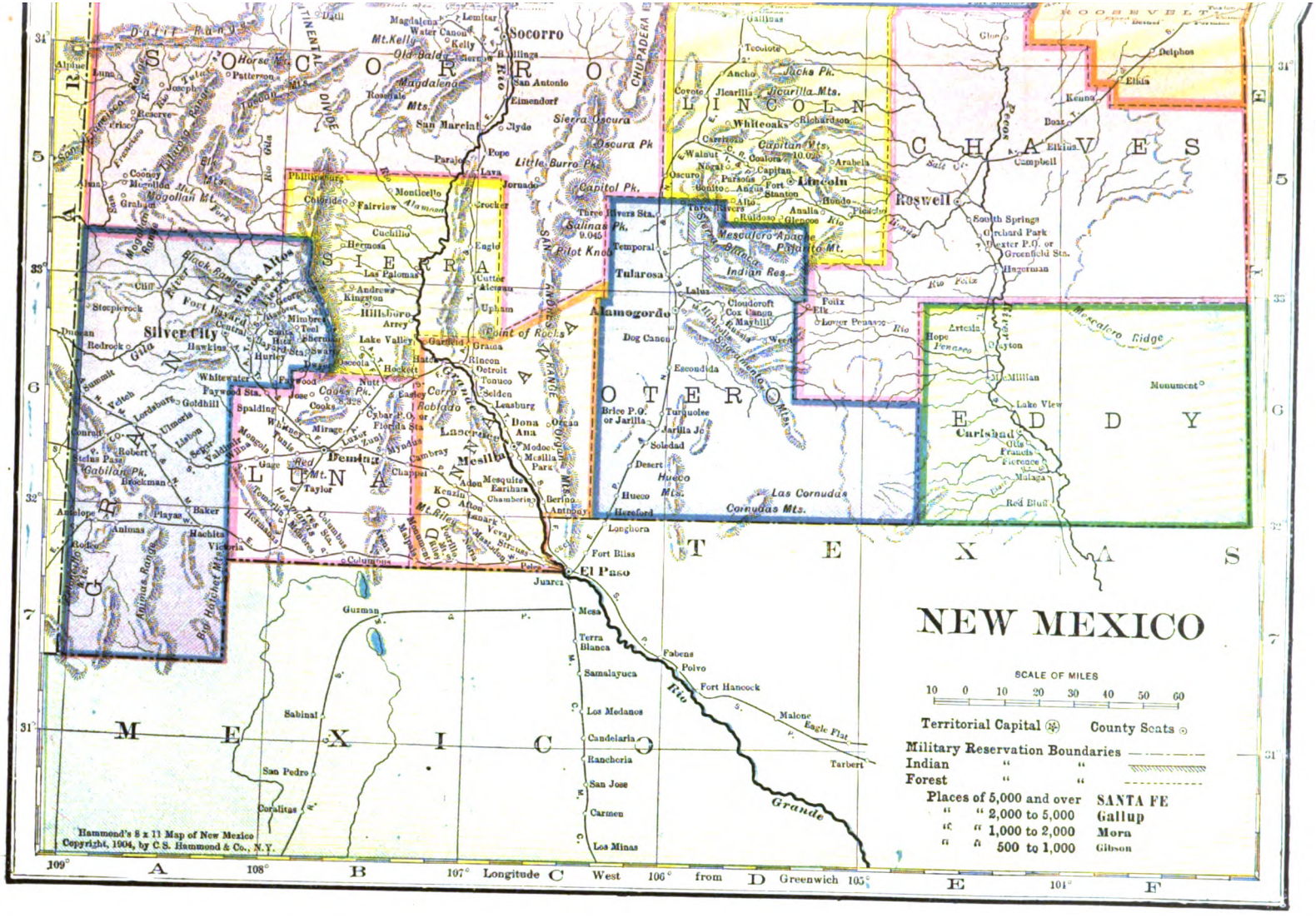
	1899	1889
Number of farms	12,311	4,458
Farms irrigated	9,128	.....
Farms not irrigated	3,183	.....
Acreage, irrigated farms	2,892,855	} 787,882
Acreage, non-irrigated farms	2,238,023	
Acres under culture	203,893	91,745
Value of irrigated farm lands	$13,551,592	} 8,140,800
Value of non-irrig. farm lands	$ 3,772,117	
Value of farm buildings	$ 3,565,105	.....
Value of live stock	$21,727,400	$25,111,201

In 1903 there were in the Territory 1,123,000 cattle, 5,674,000 sheep, 113,000 goats, and 97,500 horses. The wool clip amounted to 22,000 lbs.; 184,602 cattle were shipped, also 5,526 horses, 17,275 hides, and 422,252 sheep. Irrigated farms number 74.1 per cent of the total, and in acreage 56.4 per cent; in value of land and improvements, exclusive of buildings, 78.2 per cent; in buildings, 77.8 per cent; in implements and machinery, 75.9 per cent; in live stock, 49.7 per cent; in total farm wealth, 64.5 per cent. Average size of all farms (exclusive of those of Indians), 464 acres; of irrigated farms, 360 acres; average value per acre for irrigated land, $29.26; for best irrigated alfalfa land, $50 to $100; for irrigated fruit land, up to $400 and sometimes $500 per acre.

The principal crops in 1899, with their acreage, yield, and value, were:

Crops	Acreage	Yield	Value
Corn	41,345	677,305 bu.	$519,936
Wheat	37,907	603,303 bu.	390,616
Oats	15,848	342,777 bu.	154,347
Barley	1,110	24,107 bu.	12,475
Potatoes	1,169	72,613 bu.	54,140
Forage	87,358	177,390 tons	1,427,317
Beans	3,349	36,022 bu.	73,001
Pease	2,220	28,071 bu.	.....
Onions	160	25,014 bu.	.....
Orchard fruits	7,219	267,835 bu.	197,331

Mineral Resources.—The mining industry is important. From 1860 to 1890 $17,600,000 in gold was produced; in 1903 the value of the yield was: gold, $384,685; silver, $148,659; copper, $860,737; lead, $94,936. Coal mining is extensively carried on, although only the fields adjacent to the railroads have been worked. The output of coal in 1900–03 (mostly bituminous) was 3,710,004 tons, valued at $5,011,281. During the same period 94,097 tons of coke were produced, valued at $252,642. Twenty-eight coal mines were in operation in 1903, with 2,341 operatives and a production of 1,359,530 tons. The coal area lies chiefly in McKinley, San Juan, Colfax,


NEW MEXICO
SCALE OF MILES
10 0 10 20 30 40 50 60
Territorial Capital
County Seats
Military Reservation Boundaries
Indian " "
Forest " "
Places of 5,000 and over SANTA FE
" " 2,000 to 5,000 Gallup
" " 1,000 to 2,000 Mora
" " 500 to 1,000 Gibson
Hammond's 8 x 11 Map of New Mexico
Copyright, 1904, by C.S. Hammond & Co., N.Y.
Longitude West from Greenwich
SOCORRO
LINCOLN
CHAVES
OTERO
EDDY
GRANT
SIERRA
LUNA
DONA ANA
Silver City
Deming
Las Cruces
Mesilla
Alamogordo
Roswell
Carlsbad
El Paso
Juarez
Tularosa
Lincoln
Socorro
MEXICO
TEXAS
Rio Grande
Rio Pecos
Rio Hondo
Rio Penasco
Rio Felix
Gila River
Black Range
Mimbres River
Florida Mts.
Organ Mts.
Sacramento Mts.
Capitan Mts.
Jicarilla Mts.
Sierra Oscura
Oscura Pk
Capitol Pk.
Salinas Pk.
Pilot Knob
Mescalero Ridge
Mescalero Apache Indian Res.
Fort Bliss
Fort Hancock
Eagle Flat
Tarbert
Malone
Hueco Mts.
Las Cornudas Mts.
Cornudas Mts.
Monument
Lake Valley
Hillsboro
Kingston
Lordsburg
Deming
Columbus
Hachita
Playas
Animas
Antelope
Rodeo
Gabilan Pk.
Florida Mts.
Mt. Riley
Mt. Cox
Cooks Pk.
Mt. Taylor
Gallinas
Tecolote
Ancho
Jicarilla Mts.
Whiteoaks
Richardson
Carrizozo
Capitan Mts.
Lincoln
Fort Stanton
Ruidoso
Glencoe
Three Rivers
Alto
Angus
Arabela
Elkins
Campbell
Roswell
South Springs
Orchard Park
Dexter P.O. or Greenfield Sta.
Hagerman
Artesia
Hope
Penasco
Clayton
McMillan
Lake View
Carlsbad
Otis
Francis
Florence
Malaga
Red Bluff
Delphos
Ellis
Kenna
Dexter
Monument
Alamogordo
Dog Canon
Cloudcroft
Cox Canon
Mayhill
Foltz
Elk
Lower Penasco
Escondida
Briggs P.O. or Jarilla
Turquolee
Jarilla Jc.
Soledad
Desert
Hueco
Hereford
Longhorn
Mesa
Terra Blanca
Fabens
Polvo
Samalayuca
Fort Hancock
Los Medanos
Candelaria
Ranchería
San Jose
Carmen
Los Minas
Sabinal
San Pedro
Coralitas
Guzman
Tularosa
Three Rivers Sta.
Temporal
Point of Rocks
Rincon
Ortolt
Tonuco
Selden
Leasburg
Dona Ana
Organ
Modoc
Mesilla Park
Mesquite
Earlham
Chamberino
Anthony
Berino
Aden
Afton
Vesta
Strauss
Pelot
Columbus
Palomas
Cuchillo
Hermosa
Las Palomas
Andrews
Cuttee
Alemeda
Upham
Garfield
Grama
Hatch
Hockett
Nutt
Cooks
Cooks Pk.
Cypher P.O. or
Florida Sta
Mimbres
Faywood
Faywood Sta.
Whitewater
Gold Hill
Spalding
Mirage
Cambray
Chappel
Red Mt.
Taylor
Gage
Deming
Lake Valley
Hillsboro
Arrey
Kingston
Las Palomas
Cuchillo
Hermosa
Fairview
Monticello
Colorado
Philippsburg
Crocker
Eagle
Lava
Jornado
Little Burro Pk.
Oscura Pk
Sierra Oscura
Jyde
San Marcial
Rosedale
Magdalena
Mt. Kelly
Old Baldy
Water Canon
Lemitar
Socorro
Bullinga
San Antonio
Eimendorf
Datil
Datil Mts.
Horse Mt.
Patterson
Alpine
Luna
Reserve
Frisco
Coolney
Mogollon
Mogollon Mts.
Graham
Alma
Mogollon Mts.
Black Range
Fort Hayard
Central
Santa Rita
Hurley
Pinos Altos
Silver City
Hanover
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Central
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Black Range
Mogollon Mts.
Stephenson
Duncan
Redrock
Gila
Hachita
Victoria
Animas
Playas
Baker
Antelope
Rodeo
Gabilan Pk.
Florida Mts.
Mt. Riley
Mt. Cox
Cooks Pk.
Mt. Taylor
Gallinas
Tecolote
Ancho
Jicarilla Mts.
Whiteoaks
Richardson
Carrizozo
Capitan Mts.
Lincoln
Fort Stanton
Ruidoso
Glencoe
Three Rivers
Alto
Angus
Arabela
Elkins
Campbell
Roswell
South Springs
Orchard Park
Dexter P.O. or Greenfield Sta.
Hagerman
Artesia
Hope
Penasco
Clayton
McMillan
Lake View
Carlsbad
Otis
Francis
Florence
Malaga
Red Bluff
Delphos
Ellis
Kenna
Dexter
Monument
Alamogordo
Dog Canon
Cloudcroft
Cox Canon
Mayhill
Foltz
Elk
Lower Penasco
Escondida
Briggs P.O. or Jarilla
Turquolee
Jarilla Jc.
Soledad
Desert
Hueco
Hereford
Longhorn
Mesa
Terra Blanca
Fabens
Polvo
Samalayuca
Fort Hancock
Los Medanos
Candelaria
Ranchería
San Jose
Carmen
Los Minas
Sabinal
San Pedro
Coralitas
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Three Rivers Sta.
Temporal
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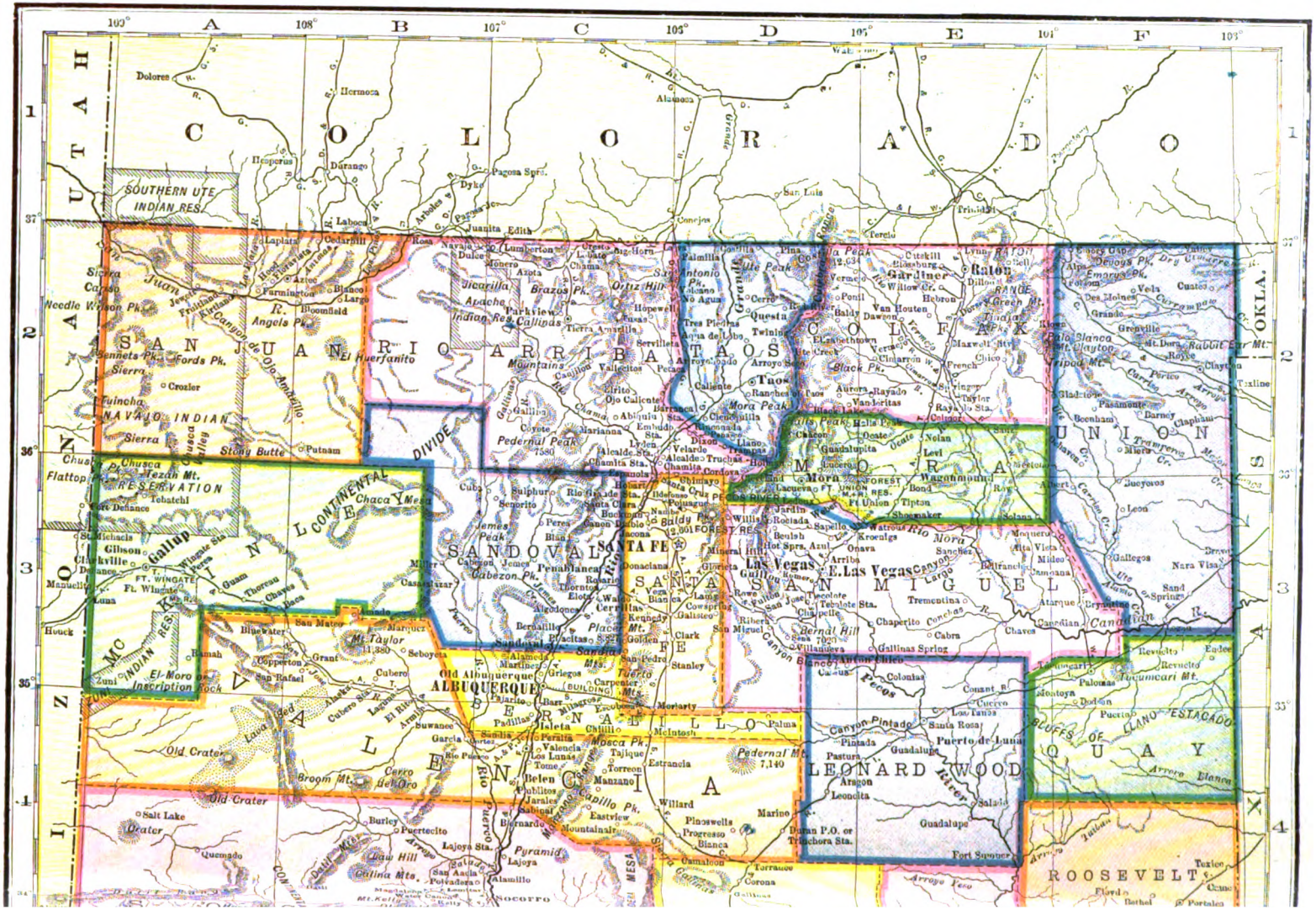

COLORADO
UTAH
OKLA.
SAN JUAN
RIO ARRIBA
TAOS
COLFAX
MORA
UNION
SANDOVAL
SANTA FE
SAN MIGUEL
VALENCIA
TORRANCE
LINCOLN
CHAVES
ROOSEVELT
QUAY
SOUTHERN UTE INDIAN RES.
NAVAJO INDIAN RESERVATION
MC INDIAN RES.
CONTINENTAL DIVIDE
ALBUQUERQUE
SANTA FE
Las Vegas
E. Las Vegas
LEONARD WOOD
Gallup
Grants
Raton
Gardiner
Taos
Questa
Farmington
Bloomfield
Aztec
Durango
Dolores
Hesperus
Cortez
Mancos
Dulce
Chama
Tierra Amarilla
Abiquiu
Ojo Caliente
Velarde
Alcalde
Española
Pojoaque
Tesuque
Nambe
Chimayo
Cordova
Truchas
Penasco
Embudo
Dixon
Peñasco
Rio Arriba
Lyden
Coyote
Gallina
Cebolla
Canjilon
Mesa
Gobernador
Counselor
Lindrith
Cuba
Regina
Cabezon
Jemez Springs
Jemez Pueblo
Bernalillo
Corrales
Los Ranchos
Rio Rancho
Placitas
Sandia
Tijeras
Edgewood
Moriarty
Estancia
Mountainair
Willard
Torreon
Manzano
Punta de Agua
Abo
Gran Quivira
Duran P.O. or Trinchora Sta.
Pinos Wells
Progresso
Bianca
Encino
Corona
Vaughn
Santa Rosa
Puerto de Luna
Pintada
Guadalupe
Pastura
Aragon
Leonora
Salado
Fort Sumner
Taiban
Texico
Melrose
Clovis
Portales
Elida
Dora
Roswell
Hagerman
Lake Arthur
Artesia
Carlsbad
Loving
Malaga
Hope
Dayton
Lakewood
Hagerman
Dexter
Hope
Roswell
Elida
Kenna
Causey
Lingo
Milnesand
Dora
Floyd
Bethel
Portales
Texico
Clovis
Melrose
Grady
Fort Sumner
Taiban
Puerto de Luna
Santa Rosa
Colonias
Tucumcari
Tucumcari Mt.
Revuelto
Endee
Palomas
Montoya
Dodson
Puerto
Cuervo
Los Tanos
Comanche
Canyon Pintado
Canyon Largo
Canadian
Chaperito
Conchas
Cabra
Gallinas Spring
Bernal Hill
Canyon Blanco
Tecolote
Trementina
Sand Springs
Gallegos
Nara Visa
Rio Mora
Watrous
Kroenigs
Sapello
Rociada
Beulah
Hot Spgs. Azul
Onava
Sanchez
Rita Vista
Mideo
Damiana
Bellfranch
Arroyo Seco
Arroyo Hondo
Arroyo Tenorio
Arroyo Mascaras
Arroyo Colorado
Arroyo Chamisa
Arroyo Cebolla
Arroyo Ojito
Arroyo Tapia
Arroyo Salado
Arroyo Peñasco

MAU

and Rio Arriba counties, in the northern and western parts of the Territory. The coal-bearing formations aggregate 1,850,000 acres, of which about 40 per cent is probably productive. Iron, salt, gypsum, clay, soda, ochre, potash, mica, marble, molybdenum, tungsten, and vanadium are also found, as are turquoise, garnets, opals, and chalcedony. Mineral springs are abundant.

Political Divisions.— The following table gives the counties, with their area, property assessment, population, and county-seats:

County	Area (sq. m.)	Property assessment	Population (1900)	County-seat	Population (1900)
Bernalillo	1,567	$3,103,120	15,465	Albuquerque	6,238
Chaves	9,599	2,939,012	4,773	Roswell	2,049
Colfax	3,897	2,981,411	10,150	Raton	3,540
Doña Ana	3,818	2,189,899	10,187	Las Cruces	2,906
Eddy	6,506	1,937,914	3,229	Carlsbad	963
Grant	7,423	2,912,977	12,883	Silver City	2,735
Leonard Wood	3,952	923,017	5,429*	Santa Rosa	247
Lincoln	4,954	1,348,802	4,953	Lincoln	.....
Luna	3,024	1,502,691	New Co.	Deming	1,341
McKinley	5,377	968,107	New Co.	Gallup	2,946
Mora	2,542	1,175,823	10,304	Mora	741
Otero	6,870	1,570,864	4,791	Alamogordo	1,520
Quay	2,805	762,998	New Co.	Tucumcari	.....
Rio Arriba	5,810	981,656	13,177	Tierra Amarilla	844
Roosevelt	3,110	649,164	New Co.	Portales	353
Sandoval	3,959	792,565	New Co.	Sandoval	.....
San Juan	5,598	679,491	4,828	Aztec	458
San Miguel	5,001	4,732,436	22,053	Las Vegas	3,552
Santa Fé	2,160	2,207,842	14,658	Santa Fé	5,603
Sierra	3,081	1,326,820	3,158	Hillsboro	557
Socorro	15,250	2,086,610	12,195	Socorro	1,512
Taos	2,265	677,820	10,889	Taos	1,225
Union	6,037	2,021,640	4,528	Clayton	750
Valencia	7,944	1,359,786	13,895	Los Lunas	458

* Population is that of Guadalupe County, out of which Leonard Wood County was principally formed.

Climate.— The climate is very dry and healthful, and has made the Territory justly celebrated as a resort for those afflicted with pulmonary troubles. The annual mean temperature ranges from 42.4° at Winsors, San Miguel County (8,000 feet), to 65° at Carlsbad, Eddy County (3,122 feet). The highest temperature recorded in 1902 was 112° at Carlsbad (25 June), and the lowest —12° at Bluewater, Valencia County (2 Feb.). The total precipitation for 1902 ranged from 22.42 inches at Carlsbad, to 4.66 inches at Deming, Luna County. Nearly half the precipitation (10.5 inches) at Carlsbad occurred in July. The greatest rainfall occurs between May and August, the least between February and April. The number of rainy days in 1902 ranged from 78 at Santa Fé to 18 at Albuquerque; average, about 40 days. The prevailing winds are southwest, west, southeast, and east. Although the summer temperature is sometimes high, especially in the southern part, owing to the dryness of the atmosphere the heat is never oppressive and the nights are always cool.

Population.—(1870) 91,874; (1880) 119,565; (1890) 153,593; (1900) 195,310 (native, 181,685; foreign, 13,625; males, 104,228; females, 91,082; white, 180,207; colored, 15,103—of whom 13,144 are Indians). Illiterates form 33.2 per cent of the total population, a reduction from 44.5 per cent in 1890.

Finances.—The Territorial net assessment for taxation in 1903 was $39,596,951, and the exemption $2,235,615. In 1893 the total assessment was $41,602,198. In the former year the indebtedness was $1,098,300, and the indebtedness sinking fund $134,590. Revenue from taxation aggregated $419,622; from other sources, $156,788. Territorial tax rate in 1902, 13.99 mills. United States internal revenue collected in 1903, $33,918. There are 19 national and 11 State banks, with resources of $10,696,449; capital stock, $1,439,200; deposits, $7,440,409 (National, $5,675,594; State $1,764,815); loans and discounts, $5,803,697. The value of Territorial buildings and grounds is about $2,000,000.

Education.—The number of public schools in the Territory in 1903 was 655, with 757 teachers. The school population (5–21 years) was estimated at 68,152, the enrolment 37,646, and the average attendance 24,856. The expenditure for public schools was $287,545, and the value of school property $690,697, exclusive of land grants. The Territory maintains the University of New Mexico at Albuquerque, the College of Agriculture and Mechanic Arts at Las Cruces; a Normal University at Las Vegas, a Normal School at Silver City, a School of Mines at Socorro, and a Military Institute at Roswell. The government supports Indian training schools at Santa Fé and Albuquerque, with 300 pupils each, also two boarding schools with 174 pupils, and 19 day schools with about 600 pupils. The educational facilities of the Territory have greatly increased in the last 10 years. In 1901 there were 11 public, society, and school libraries having 1,000 volumes or more, aggregating 27,732 volumes, or 14 books per 100 population.

Religion.—The population consists largely of Roman Catholics, who have an archbishop, a bishop, a vicar-general, 16 regular priests, 43 secular priests, 42 churches, 325 mission churches, 6 academies for young women, a college, 8 parochial schools, 2 Indian boarding schools with 300 pupils, 2 day schools for Indians with 200 pupils, and 2 academies for boys. The Baptists have 36 churches, a college, and several mission schools; the Methodists 17 English-speaking and a number of Spanish-speaking congregations, together with a number of mission schools; the Presbyterians 45 congregations, 30 preaching stations, 25 mission schools with 45 teachers and 1,562 pupils; the Mormons 2 churches with 277 members. Other Protestant denominations have

about 20 congregations, and the Hebrews 5 organizations and 2 synagogues.

Charitable, Penal, etc.—The Territory supports an asylum for the insane at Las Vegas, an asylum for the deaf and dumb at Santa Fé, an institute for the blind at Alamogordo, a miners' hospital at Raton, a reform school at El Rito, and an orphanage at Belen. The Territorial Penitentiary is situated at Santa Fé. A hospital and orphanage at Santa Fé and a sanatorium at Albuquerque are supported by the Roman Catholic Sisters of Charity; there are also two hospitals at Silver City, one at Deming, and one at Carlsbad, all of which are supported in part by the Territory. Government sanatoria are in successful operation at Fort Bayard and Fort Stanton, where several hundred soldiers and sailors from all parts of the country have been cured of pulmonary tuberculosis. There are also several private sanatoria in the Territory.

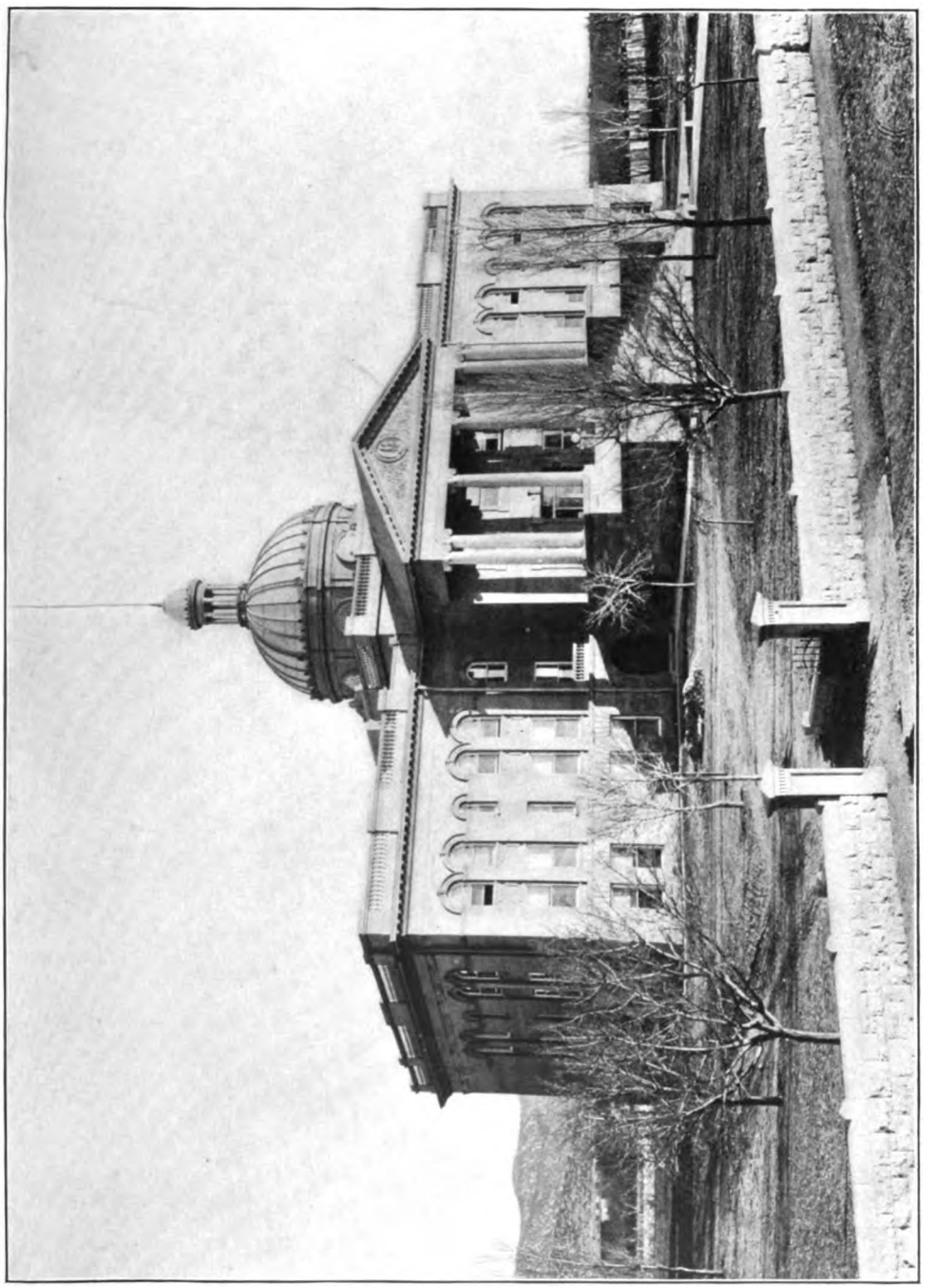
Transportation.—The total railroad mileage of New Mexico in 1903 was 2,520, an increase of 841 miles in three years.

There were 393 post-offices and 70 periodicals (5 daily, 60 weekly, 5 monthly).

History.—For untold generations before the discovery of America, New Mexico was the home of sedentary tribes of Indians — the ancestors of the present Pueblos — as well as of nomadic predatory tribes. The former constructed villages, principally of stone, on the mesas, in the shelves of rocky cliffs (see CLIFF-DWELLERS), and in the valleys. Their numbers considerably exceeded that of their descendants of to-day, but there is no reasonable ground for the generally popular belief that New Mexico ever contained a teeming sedentary aboriginal population, notwithstanding the hundreds of ruins scattered throughout its area, particularly west of the Rio Grande. There is definite historical as well as traditionary evidence that many of the pueblos occupied at the time of the discovery of the Southwest were later abandoned on account of Apache and Navaho raids, or by reason of epidemics, the failure of water supply, through superstition, or the efforts of early Spanish missionaries to concentrate the natives. Many ruined pueblos in the Territory may thus be accounted for; for although Coronado in 1540–2 recorded 64 inhabited villages, some of them extensive, only two (Acoma and Isleta) of the 17 which remain still occupy their 16th century sites. The recorded history of New Mexico dates from 1539, in which year Marcos de Niza, a Franciscan friar, accompanied by a Barbary negro named Estevan, or Estevanico, traversed the country from Mexico to the Zuñi Indian villages, then known as the "Seven Cities of Cibola," in the western part of the Territory. Estevan, preceding Fray Marcos during the latter days of the journey, was killed by the natives at their village of Hawikuh, one of the seven towns; Niza followed, viewed the pueblo from an adjacent height, and fled back to Mexico. In February of the following year Francisco Vasquez Coronado, guided by Niza and accompanied by a large force, marched from Compostela, Mexico, to Cibola, storming and capturing Hawikuh (which he named Granada), in July. Expeditions sent out from here by Coronado resulted in the discovery of the Hopi or Moqui villages (called Tusayan) in northeastern Arizona, and the Grand Cañon of the Colorado. In the autumn the army moved to the province of Tiguex, in the vicinity of the present Bernalillo, on the Rio Grande, where winter quarters were established and whence parties were sent to visit the neighboring pueblos.

In the spring of 1541 Coronado crossed the Pecos River into the present Texas and northward through the buffalo plains to the Wichita settlements of Kansas — the "Province of Quivira" — where several months were spent in exploration; but gold, which formed the object of the dreary march, was not found. The expedition returned to the Rio Grande, and thence to Mexico in the spring of 1542, having spent nearly two years in the country. Two friars remained in New Mexico and one in Kansas, but these were killed by the Indians. New Mexico was visited in 1581 by Francisco Sanchez Chamuscado, with a small escort and three Franciscans, the latter being left among the Rio Grande Pueblos. These were killed after Chamuscado's departure. Late in 1582 Antonio de Espejo, with a bodyguard, was authorized to explore the new province and to learn the fate of the missionaries. Following the route of Chamuscado up the Rio Grande, he reached Puala, or Puaray, near the present Bernalillo (the principal town of Coronado's Province of Tiguex), where the friars had been slain, the Indians fleeing on his approach. From this point Espejo extended his travels to the pueblos of Sia, Jemez, Acoma, and Zuñi, and to the Hopi towns of Arizona, thence eastward to the Rio Pecos and back to Mexico. The next important event was the colonization of New Mexico by Juan de Oñate, the first governor of the province, who reached the new country via the Rio Grande in 1598 with about 400 colonists, and established the town of San Francisco de los Españoles, later known as San Gabriel, where Chamita, at the mouth of the Rio Chama, now stands. All the sedentary tribes were visited and their vows of obedience and vassalage taken, and the country from eastern Kansas to the head of the Gulf of California explored between 1598 and 1605. In the latter year San Gabriel was abandoned and the seat of government moved to Santa Fé, which dates from this time. During the following few years the new colony barely existed; in 1617 it had only 48 soldiers and colonists, although the missionaries had been so zealous that 11 churches had been built and 14,000 natives baptized. In 1680 the Pueblos rebelled against Spanish authority, killed many missionaries and colonists, and laid siege to Santa Fé, where the panic-stricken survivors had taken refuge in the adobe Palace, which still stands. Governor Otermin finally succeeded in driving the Indians off with considerable loss, and in retreating down the Rio Grande to El Paso, Texas, with a thousand followers, leaving the natives in almost uninterrupted possession of New Mexico until 1692. In that year Diego de Vargas reconquered the province, with great loss to the Indians, enabling its resettlement toward the close of the year by 800 colonists. In 1696 the Indians again revolted, killing five friars and 21 other Spaniards, and it was not until the close of the century that the Pueblos were entirely overcome.

Henceforward New Mexico grew in im-



CAPITOL AT SANTA FE.

Main

portance; new towns were established in the Rio Grande Valley, which slowly increased in population despite the constant depredations of the Apaches and Navahos. Early in the 19th century a considerable trade sprang up between the province and the settlements along the American frontier, notably Kaskaskia in Illinois, and later Franklin and Independence in Missouri, which increased from $22,000 in 1822 to $750,000 in 1844. This was the beginning of the overland commerce via the famous Santa Fé trail, which came to a close when the Atchison, T. & S. F. Railroad entered the Territorial capital in 1880. Mexico having thrown off the yoke of Spain in 1821, New Mexico became a Mexican province; in 1824 it was made a territory, and in 1836 a department, remaining such until 1846, when it was taken possession of by General Stephen W. Kearny in the name of the United States. In 1848, by the Treaty of Guadalupe Hidalgo (q.v.), New Mexico, the boundaries of which were very indefinite, but which comprised Arizona north of the Gila (see GADSDEN PURCHASE), and a part of Colorado, was ceded to the United States, and on 25 Nov. 1850 the Territory was organized through the agreement by Texas to the New Mexico boundary, under the Act of Congress approved 9 September. In 1863 western New Mexico became the Territory of Arizona, and in 1865 a northern strip was annexed to Colorado.

New Mexico was the scene of several conflicts during the Civil War, notably the defeat of the Federals under Canby, by the Texans under Sibley at Valverde in February 1862. Santa Fé was occupied by the Union forces in March; Sibley took possession of it a week later, but was forced to evacuate in the following month, after the defeat of the Confederates in a two-days' engagement in Apache Cañon. Efforts for the admission of New Mexico as a State have been made for many years, but thus far without success.

F. W. HODGE,
Smithsonian Institution, Washington, D. C.

New Mexico College of Agriculture and Mechanic Arts, opened in 1891, at Mesilla Park. It does not share in the United States land grant of 1862, but receives the annual appropriation from the Federal government provided for in the law of 1890, and also receives annually an appropriation from the Territory; the total income in 1902 amounted to $48,000. The regular four years' courses are general scientific, agriculture, and mechanical engineering, on completion of which the degree of B. S. is conferred. There are in addition two years' courses in agriculture and practical mechanics, a 12 weeks' course in agriculture and horticulture, a one year course in stenography and typewriting, graduate courses, and a preparatory department (five years' course). The college is coeducational, women forming about one half the number of students; there are also women on the faculty. The library in 1902 contained about 10,000 volumes; the students in all departments numbered 307, of whom 144 were in the preparatory department.

New Mexico, University of, situated at Albuquerque, incorporated in 1889 by the legislature of the Territory, and intended for the State University when New Mexico is admitted to the Union. It was first opened in 1892, and new departments subsequently added till the organization now includes the collegiate department (classical and scientific courses), the departments of music and art, a business school, and normal and preparatory departments. The degrees of bachelor of arts and bachelor of pedagogy are given; also master of arts and doctor of philosophy. Women are admitted on equal terms, and a cottage for their use has been built on the campus. Connected with the university is the Hadley Climatological Laboratory devoted particularly to the investigation of the effect of the dry and plateau regions of the United States upon health and disease. The income, which is derived largely from State appropriations, was $14,000 in 1903; the students in that year numbered 100, and the faculty 12.

New Mil'ford, Conn., town, county-seat of Litchfield County; on the Housatonic River, and on the Berkshire division of the New York, N. H. & H. railroad. It was settled in 1707 by John Noble from Westfield, Mass., and later a colony from (Old) Milford, Conn., located at New Milford. It is situated in a hilly country which has considerable good farm land; tobacco is the great specialty. The extensive water-power of the Housatonic is being utilized by means of a canal two miles long, which extends from Bulls Bridge to New Milford. The New Milford Power Company, who own the plant, will furnish electricity to towns at a considerable distance. The tobacco warehouses have over 500 employees; the wood finishing factory, 90; the hat factory, 285; upholstery works, 40; lime works, about 60. There are several other smaller manufacturing establishments. A library and Memorial Hall for the free use of the Grand Army veterans, the town hall, the churches, and schools are all fine buildings. The educational institutions are good public schools, Ingleside School for young women, and Weantinong School for boys. There are three banks, with a combined capital of about $400,000. The government is administered by three selectmen chosen annually by the people. Pop. (1890) 3,917; (1900) 4,804.

J. A. BOLLES,
Editor 'New Milford Gazette.'

New Netherlands, neth'ẽr-landz, the name given by the Dutch to the colony they established in America in 1626. A British fleet, under command of Richard Nicolls, captured the place in 1664; and by order of Nicolls, the Duke of York was made ruler and the name changed to New York. See NEW YORK.

New Or'ange, a name applied to New York in 1673, when the colony of New Netherlands was retaken from England by the States-General of Holland. The name was used in honor of the Prince of Orange.

New Orleans, La., the twelfth city of the United States in population, and the largest south of the Potomac and Ohio rivers, is situated on the Mississippi River, 107 miles from its mouth. Built in a bend, it was originally crescent-shaped, whence its title of «the Crescent City.» It has spread out in all directions, and has even taken in the suburbs on the west bank of the river, so that the resemblance to a crescent has completely disappeared.

Area and Drainage.—The corporate limits cover 189 square miles, including a large area of uninhabited swamp. The improved portion is 26,026 acres, or 41 square miles, in extent. The site of the city is several feet below the level of the river at extreme high water. The land is mostly flat, and slopes back from the Mississippi, draining into Lake Pontchartrain. These conditions have made the problem of draining and sewering the city very difficult; and it was finally solved only in 1895, when a threefold system was adopted, the sewage being emptied into the Mississippi on the south, the drainage into Lake Borgne on the east, and the ordinary rainfall into Lake Pontchartrain on the north.

In consequence of these improvements important changes have taken place in the soil and climate, which have been rendered much drier; and whereas because of the saturation of the soil it was formerly thought impossible to erect buildings more than three or four stories high, "sky-scrapers" are now built as in other American cities. As early as 1728 levees or dikes were built in front of the city to protect it against freshets. It is now surrounded by levees, and no portion of it has suffered from flood for over 50 years.

Climate.—The climate is mild and damp. A "freeze" is rare, and the thermometer has been below 17° F. only once. The mean temperature is 69° F. The summers, while long, are not excessively hot, as the nights are cool, and prostrations from sunstroke are much rarer than in other large American cities. Formerly the city suffered severely from malarial fevers, but these have disappeared with sanitary improvements, and in 1902 the death-rate among the whites had fallen to 17.2, a decrease of nearly one half, in 20 years. Among the negroes the mortality is still high.

Population.—In the years 1830-60 New Orleans increased in population from 46,310 to 168,875; the next 30 years brought the number up to 242,039; in 1900 it was 287,104; in 1903, about 325,000. The creoles, of French and Spanish origin, and once the dominant element in politics and business, still constitute one fourth of the white population, and largely determine the social tone of the city, most of the customs and usages being borrowed from them — holidays, public celebrations and balls, the carnival, the cuisine, fashions, etc. The American influence, however, is increasing steadily.

Architectural Features.— A wide central thoroughfare, Canal Street, the shopping centre, divides the old French city, *le Vieux Carré* (the Old Square) from the newer districts. The former is built in the French and Spanish architecture of a century ago. A large part of the old city was destroyed in the fire of 1788, but many buildings still remain which date back from before the fire, and there are hundreds over a century old. The oldest public building is the Archiepiscopal Palace, dating from 1737, originally erected as a convent for the Ursuline Nuns. The Cabildo, now occupied by the State Supreme Court, was erected in 1795, and was formerly the government building. Here the cession of Louisiana from France to the United States took place in 1803. The Civil Court Building, also of Spanish architecture, was erected at the same time. The Saint Louis Cathedral, originally the Parish church of New Orleans, was erected in 1723. It was twice destroyed, once by a hurricane, again by fire, and was rebuilt in 1794. The Church of St. Anthony de Padua (Italian) was formerly the mortuary chapel of the old Saint Louis cemetery. In this quarter the residences are of a characteristic architecture styled "creole," largely modeled on the plantation homes of the West Indies, the dwellings being of wood or of brick and stucco. In the more densely populated section they have large courtyards in the centre; in the suburbs they are surrounded by wide verandas or "galleries," and shaded by an abundance of shrubbery.

Besides those already mentioned, the more important public buildings are the custom-house, of New England granite and solid Egyptian architecture — for many years the largest public building in this country; the Cotton Exchange, of florid Renaissance; the Saint Louis Hotel, at one time the largest in the United States, and used for some years as the Louisiana State-house; the United States Mint, Tulane University, Newcomb College, the Public Library, Howard Memorial Library, Tulane Hall, the Church of the Immaculate Conception (Jesuit), with college attached; Christ Church Cathedral, criminal courts, city-hall, and the French Opera-house, the oldest opera-house in this country.

Parks, etc.— The city is somewhat deficient in parks. The City Park is geographically central, in what was formerly used as a dueling ground. Audubon Park, fronting on the Mississippi, was the de Boré plantation, on which sugar was first produced in Louisiana. Both are well shaded by immense live oaks over a century old. Audubon Park has a handsome horticultural hall, erected in 1884, containing a fine collection of tropical trees and plants, and here is also a model sugar and cotton farm — the Audubon Experiment Station. Jackson Square, formerly the Place d'Armes, on which the Saint Louis Cathedral, Cabildo, and court buildings face, was laid off at the foundation of the city, and was the centre of New Orleans history for a century and a half. It contains an equestrian statue of Gen. Andrew Jackson. Beauregard Square was formerly Congo Square, the gathering place of slaves in the earlier days. Lafayette Square, on which the city-hall faces, contains statues of Henry Clay and John McDonogh, who left his large fortune to educational purposes. Lee Circle contains a tall pillar surmounted by a statue of Gen. Robert E. Lee. Margaret Place contains a statue of Margaret Haughery, "the friend of the orphans." Jackson Barracks, the United States army station, has extensive grounds. On the west side of the river is the United States Naval Reservation, with a large floating dock for the use of men-of-war and a naval station in the course of construction.

Municipal Divisions and Government.—New Orleans is divided into seven municipal districts, corresponding with the towns or "faubourgs" that have at different times been annexed to the original city, and 17 wards. Its assessed valuation is $156,500,000. The government is administered by a mayor and council, but most of the municipal functions are under the control of appointive boards or commissions.

Banking.—New Orleans is the most impor-

tant banking centre of the Southwest. It has eight national, seven state, and five savings banks, with a capital of $15,890,150, deposits of $58,579,600, and resources of $77,356,346.

Commerce.— New Orleans is the second port of the United States, being exceeded in commerce only by New York. Its commerce, foreign and coastwise, amounts to $720,000,000 a year. The Mississippi River, which is the chief channel of trade, is from 1,800 to 3,600 feet wide and from 60 to 240 feet deep. Including the commercial suburbs of Port Chalmette, Gretna, and Westwego, New Orleans has a frontage on the river of 26 miles, lined throughout the greater part with wharves and docks. The present channel through the Eads jetties in South Pass permits vessels drawing 30 feet of water to ascend from the Gulf of Mexico to New Orleans. Work was begun in 1903, to be completed in 1908, on a new outlet through Southwest Pass, which will admit vessels drawing 35 feet of water.

New Orleans is the largest cotton port in America and has the largest export of cotton-seed-oil and by-products. It is first in the importation of tropical fruits, and second in coffee. Its export is also large in hides, wool, lumber, staves, rice, flour, tobacco, and all the products of the South and West.

The railroads centring at New Orleans are the Southern Pacific, Texas & Pacific, Louisville & Nashville, Southern, Illinois Central, Yazoo & Mississippi Valley, New Orleans & Northeastern, St. Louis & San Francisco, Shreveport & Red River Valley with two local lines, the New Orleans & Southern, and the New Orleans, Fort Jackson & Grande Isle, all together operating or controlling 49,363 miles of road.

All the lines have extensive yards and terminal facilities, the most important being those of the Illinois Central at Stuyvesant Docks, with a mile front on the Mississippi, and those of the Southern and the St. Louis & San Francisco at Port Chalmette, with three miles of front on the river and improvements to cost $15,000,000.

The Mississippi River, besides offering wharfage for ocean vessels, is the source of a large steamboat and barge traffic, extending to all parts of the Mississippi Valley. The Carondelet and New canals give access to Lake Pontchartrain and Mississippi Sound, and handle a large trade in coal, iron, lumber, building materials, and naval stores. There are from 5,000 to 6,000 arrivals per year by canal, generally of small vessels.

Manufactures.— The manufacturing interests have greatly developed since 1885. New Orleans has now the largest manufacture of cottonseed-oil and by-products; the largest milling of rice; and is one of the chief centres of sugar-refining, and of the manufacture of lumber, clothing, bags, cigars, and cotton goods. The census of 1900 returned 89 different industries, 1,534 factories with $46,003,604 of capital, and a total output of $63,514,505, which had increased by 1903 to more than $80,000,000.

Educational and Charitable Institutions.—The educational facilities of the city have been greatly improved and extended in recent years. Tulane University has four departments, law, medicine, the arts, and sciences, and Newcomb College for the higher education of women, all well endowed. It has 67 teachers and 1,350 students. The College of the Immaculate Conception has an average annual attendance of 400 students. There are also a college of pharmacy and a college of dentistry, besides numerous minor educational institutions. There are four colleges for negroes: Southern University (supported by the State), New Orleans University (Methodist), Leland University (Baptist), and Straight University (Congregational), with 60 teachers and 3,400 students, mainly in the preparatory grades. The public school system includes three high schools and 69 grammar and preparatory schools, with an average attendance of 32,000 children. The private and parochial (mainly Catholic) schools have an average attendance of 12,000 pupils. The Ursuline Convent, for the higher education of girls, is the oldest school of its kind in the United States, having been in uninterrupted session since 1729. Newcomb College, established in 1887, has done much for the development of education and art among the women of Louisiana. The three libraries — the Fisk and Public Libraries, the Howard Memorial, and the State Library — have a total of 180,000 volumes.

Most important among the charitable institutions is the Charity Hospital, founded in 1782. It is supported by the State, has 850 beds, accommodates an average of 8,500 patients, while 20,000 to 25,000 more are given outside treatment each year. Connected with it is the Richard Milliken Hospital for children. The Eye, Ear, Nose and Throat Hospital is also a charity institution. Other hospitals are the United States Marine Hospital, the Touro Infirmary, Hotel Dieu, New Orleans Sanitarium, and the Louisiana Retreat, the last for the insane. There are 47 asylums with 3,500 inmates, receiving small appropriations from the city, but maintained mainly by charity or endowment funds.

Churches.—There are 294 churches, of which 203 are for whites and 91 for negroes. The Catholics, with 41 churches, are strongest in point of numbers. The Baptists have 66 churches, of which 61 are for negroes; the Methodists 39, of which 21 are for negroes; the Episcopalians 14, Presbyterians and Lutherans 13 each. There are also 6 Jewish synagogues.

Cemeteries.—The cemeteries number 33, some of them being in the central portion of the city. The dead are usually buried above ground in vaults on account of the humidity of the soil. The National Cemetery at Chalmette contains the bodies of many Union soldiers.

History.—The site of New Orleans, on which stood a village of the Houma Indians, was first visited in 1699 by a French expedition under Bienville, who in 1718 obtained the consent of the French government to the establishment of a colony there, and the city was laid out and named in honor of the French regent, the Duc d'Orléans. In 1726 it was made the capital of the French colony of Louisiana, which then included nearly all the Mississippi Valley. The first colonists, either Frenchmen or French Canadians, were reinforced by settlers from the West Indies and Germans sent over by John Law (q.v.). The province having been transferred to Spain in 1763, a Spanish force was sent to take possession of New Orleans, but was driven out by the inhabitants, who established a government of their own, to which the Spaniards put an end in 1769. The population, at that time,

3,190, was greatly increased during the period of Spanish domination by accessions from Spain, the Canary Islands, and Santo Domingo, and of French Acadians from Nova Scotia. The original population was never friendly to Spain. By Spanish governors New Orleans was walled and surrounded with fortifications. At the time of the Louisiana Purchase (q.v.), in 1803, its inhabitants numbered 11,856; its commerce was large, and its society, which included many families of wealth and culture, was noted for fashion and refinement.

New Orleans was incorporated as a city in 1804. When, in 1812, Louisiana (q.v.) was admitted to the Union as a State, the city was its capital, as it had been that of the province, remaining such until 1852. From 1865–80 it was again the State capital.

On 8 Jan. 1815 occurred the battle in which Gen. Andrew Jackson defeated the British army under Gen. Pakenham. It was fought at Chalmette, now a suburb of the city.

The racial jealousies existing between the creoles and the new comers or Americans led to division of New Orleans in 1836 into three municipalities, each with a government of its own. They were consolidated again in 1852, at which time New Orleans was the third city in population in the Union, and was disputing with New York the first place in commerce.

Soon after the secession of Louisiana from the Union and the establishment of the Confederate government, New Orleans was blockaded by the Federal fleet under Farragut. It was captured in April 1862. A succession of misfortunes followed the Civil War — epidemics, political troubles, and the inundation of the surrounding country. The city for a time increased slowly in population and actually declined in commerce and business. Improvement began in 1879, with the Eads jetties, which enabled vessels of larger draft to enter the Mississippi. A more marked gain came in 1896 in the way of improved sewerage and drainage, for which the people voted a special tax of $16,000,000. Better sanitary conditions were secured, and then followed the increase and extension of railroad facilities, the opening up of new territory to trade, and the development of manufacturing industries, all leading to the present rapid growth and sustained prosperity of the city.

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New Orleans, Battle of, The, in American history, an engagement fought on 8 Jan. 1815, between a force of 12,000 British under Sir Edward Pakenham, and one of 6,000 Americans under Gen. Andrew Jackson. The latter were in a strongly intrenched position and awaited Pakenham's assault on their lines. The battle lasted only 25 minutes, when the British fled, leaving behind them 2,600 killed and wounded. Pakenham was among the slain. The Americans' loss was only 8 killed and 13 wounded. In this battle the weight and precision of the American fire were such that no troops in the world could have stood against it. One British authority says that not even from Saint Sebastian had so severe a fire been poured upon an attacking force. One British regiment, the 93d Highlanders, distinguished for its services in many parts of the world, lost more than half its men, having been brought to a point where it could do no good, but where it could be most effectually operated upon by the Americans. The British troops never behaved better, but they were badly handled.

New Orleans, Capture of, in 1862. The Civil War engagement which resulted (24 April) in the taking of New Orleans, was actually fought 70 miles down the Mississippi. The great bend next below the city was commanded by Fort Jackson on the west (north) bank, and Fort Saint Philip on the east. Supposed to mount 150 guns each, they had in fact 109 together, over half of them only 24's; and the garrison was largely Northerners and foreigners. The river was blocked by a chain buoyed by 11 steamer-hulks, and there were fire-raft and boats above. Farragut's fleet comprised 17 wooden vessels with 154 guns; besides six gunboats with 30 guns and 20 mortar-schooners with one gun each, under command of David D. Porter (q.v.). Bombardment on the forts was opened 18 April; and on the night of the 20th a Union vessel hugging the bank got above the boom, and coming down with a full head and current, snapped the chain and left the channel free. After three days' more bombardment it was determined to pass the forts instead, in the dark, and on the morning of the 24th, about 2:30, the vessels steamed forward in two columns, Farragut leading one in the Hartford, Capt. Theodorus Bailey the other, while the mortar-boats shelled the water-battery commanding the approach to Fort Jackson. All but the last three of Farragut's column succeeded in passing the boats before daylight made it impossible, the vessels' guns in turn driving the fort gunners from their posts. Above, the Confederate flotilla of 17 vessels inflicted great damage, one Union gunboat being sunk, one badly crushed by a ram and the Hartford fired by a fire-boat. Nine Confederate vessels were sunk or captured, however, and the Union fleet proceeded to New Orleans and compelled it to surrender. On the 28th the forts also capitulated. It is due to history to add that of the 17 Confederate vessels, 9 of which were rams and 2 ironclads, only 4 vessels and 12 guns were in such condition as to be capable of making a fight. If the materials of the force of John K. Mitchell, the Confederate commander, had been completed, his little fleet could have made a very creditable defense; but J. R. Soley, of the United States navy, truly says that no commander, taking hold of his vessels in their incomplete condition four days before the fight, could have made much out of them. This victory of Farragut's prevented Louis Napoleon from recognizing the Confederacy and raising the blockade, and hence was one of the most important of the war.

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New Orleans University, in New Orleans, La.; coeducational, founded in 1873 under the auspices of the Methodist Episcopal Church. It has preparatory and collegiate departments, and its courses lead to the degrees of A.B., B.S., and Ph.B. In 1903 there were connected with the school 24 professors and instructors and nearly 600 students. The library contained over 6,000 volumes, the grounds and buildings were

valued at $130,000, the productive fund was about $12,000, and the income about $8,000.

New Philadel'phia, Ohio, city, county-seat of Tuscarawas County; on the Tuscarawas River and the Ohio Canal, and on the Pennsylvania and the Cleveland, L. & W. R.R.'s; about 100 miles northeast of Columbus and 90 miles south of Cleveland. It was settled in 1805 and incorporated in 1808. It is in an agricultural region, but its good water-power and facilities for transportation have contributed toward making it a manufacturing city. Some of the manufactures are pressed, stamped, and enameled goods, steel products, flour, woolen goods, brooms, canned goods, tile, and wagons and carriages. Shorenbraun Springs and Springer's Park are of interest. The mayor is elected biennially, and the council appoint or elect the administrative officials. Pop. (1890) 4,456; (1900) 6,213.

New Philippines, fĭl'ĭp-pĭnz or -pēnz, a name sometimes given to the Caroline Islands (q.v.).

New Pla'tonists. See NEO-PLATONISM.

New Pomera'nia, or **Neu Pommern,** noi pōm'ĕrn, formerly NEW BRITAIN, the largest island of the Bismarck Archipelago (q.v.), 50 miles distant from Kaiser Wilhelm's Land, New Guinea, Rock Island and the Dampier, and the Vitiaz straits, intervening. It is crescent shaped, 300 miles long, with a maximum breadth of 90 miles, and an estimated area of 9,500 square miles. There is a German mission and trading station on the northeast coast. The inhabitants are savage Papuans.

New Prov'idence, one of the Bahama Islands (q.v.), northeast of Andros Islands and about 300 miles east by north of Key West. In 1629 the first English settlement on the Bahamas was made on New Providence. This island has the best harbor of any of the group. Nassau (q.v.), the capital of the islands, is on New Providence. Although this island, as all of the group, belongs to Great Britain, it is a part of Roman Catholic archdiocese of New York.

New Red Sandstone, in geology, a term formerly used, in contra-distinction to Old Red Sandstone (q.v.), of red shale, loam and sandstone lying above the coal measures. The nomenclature is faulty, being based only on a color distinction, and it is now recognized that the rocks formerly grouped under this name are at two very different eras, the Permian and Triassic (qq.v.).

New River. See GREAT KANAWHA.

New Rochelle, rō-shĕl', N. Y., city, in Westchester County; on Long Island Sound, and on the New York, N. H. & H. railroad; 16½ miles from the Grand Central Station in New York city. It has connection by electric railroads and trolleys with New York city and several of the villages and cities in the vicinity. It was settled in 1687 by Huguenots, and was named after La Rochelle, France. It has a beautiful location, and is considered a desirable residential city by a large number of the business men of New York. It has a well-kept park, and Glen Island, Echo and Neptune bays are nearby. The prominent buildings are a number of old colonial edifices, several of the churches, especially Saint Gabriel's (R.C.), with its parish school building, both gifts of Adrian Iselin, the Masonic Temple, a hospital, Knights of Columbus and the city buildings. The water supply is exceptionally pure; and the vital statistics show a low death rate. It is the seat of the Ursuline Seminary of Saint Teresa, founded in 1898, and it has several private schools, good public and parish schools, and a public library which contains about 9,000 volumes. Thomas Paine resided here for some years. At present (1904) it is the home of a number of well known authors and artists. Pop. (1890) 9,057; (1900) 14,720.

New Roof, The, a term used in early American history for the Federal Constitution.

New Sallee, să-lă', Morocco. See RABAT.

New Sarum, să'rŭm. See SALISBURY.

New School Presbyterians. See PRESBYTERIANISM.

New Shet'land. See SOUTH SHETLAND ISLANDS.

New Sibe'ria, or **Liakhof** (lē-ăH'ŏf), **Islands,** a group of islands in the Arctic Ocean, off the north coast of Siberia, between the mouths of the Lena and Indigirka, and administratively attached to the government of Yakutsk. The group comprises Liakhof, Maloi, New Siberia, Thaddeus, Kotelnoi, and Bennett Islands; the area is estimated at 20,480 square miles; they are rocky, treeless, icebound all the year round, and uninhabited. Reindeer, foxes, and white bears are found, and there is immense wealth in fossil ivory, the remains of mammoth, rhinoceros, and buffalo.

New Som'ersetshire, in American history, a name given the territory extended to William Gorges in 1636, and comprising those settlements along the coast of Maine, which had not been included in the Ferdinando Gorges patent of 1631. William Gorges was appointed first deputy-governor of the district.

New South Shetland Islands. See SOUTH SHETLAND ISLANDS.

New South Wales, Australia, the oldest Australasian colony of Great Britain and since 1901 one of the six original and the most populous, though not the largest, state of the commonwealth, in the southeastern portion of the continent. It is separated from Queensland on the north by an irregular line running southwest from Port Danger in lat. 28° 8′ S., till it meets the 29th parallel of latitude which forms the rest of the north boundary; on the east the Pacific Ocean is the boundary; on the south the Murray River, and a line running northwest from Cape Howe, lat. 37° 31′ S., separates it from Victoria; while on the west the 141st meridian forms the boundary between the state and South Australia.

The state has an area of 310,700 square miles divided into 141 counties. It is more than twice the size of the State of California and five times the size of England and Wales.

Topography.—The surface, more especially in the eastern and most populous portion, is much diversified, and presents, in its general features, a succession of hills and valleys, mountains and plains. The great dividing chain forming the great watershed of the state, with many summits

varying in height from 3,000 to 6,000 feet, extends from north to south nearly parallel to the coast, at the distance commonly of from 30 to 50 miles inland or sometimes more, and takes in the north the name of Liverpool Range, in the centre that of the Blue Mountains, and in the south that of the Australian Alps. The highest summit is Mount Kosciusko, in the southeast 7,328 feet. The space between the mountains and the sea is partly broken by spurs and ramifications, but descends from the west with more or less rapidity, and has a generally undulating surface, intersected by water-courses; in some places well wooded, and in others covered with dense brush-wood. The coast line presents in general bold perpendicular cliffs of sandstone, in horizontal strata. Occasionally the cliffs are interrupted by low sandy beaches, some of which stretch to a considerable distance inland, and appear to have been covered by the sea at no very remote period. The indentations of the coast are remarkable for their number, and the excellent harbors which they form. Among them are Port Stephens, Port Hunter, Broken Bay, Port Jackson (on which lies Sydney), Botany Bay, Jervis Bay, Sussex Haven, and Twofold Bay.

Hydrography.—The most important rivers are the Murray, which is navigable as far as Albury (lon. 147° E.); the Murrumbidgee and Lachlan, farther north, which after uniting fall into the Murray; and the Darling, which flows from northeast to southwest through the whole extent of the state, and also falls into the Murray. The Darling, in its upper course known as the Barwon, has among its more considerable affluents the Bogan, the Macquarie, the Castlereagh, the Namoi, the Gwydir, the Macintyre, and the Warrego. The Murrumbidgee is 1,350 miles long, the Darling 1,160, the Macquarie 750, the Lachlan 700. Notwithstanding the existence of those large rivers the western plains are but sparsely watered. The comparatively narrow space between the mountains and the Pacific leaves little room for the development of large rivers. Many of them are for a great part of the year either altogether dry, or form a succession of deep ponds or waterholes instead of continuous streams. The chief are the Hunter, 300 miles, which falls into the fine port of that name at Newcastle, and is navigable for 50 miles above its mouth by small craft of 30 to 40 tons; and the Hawkesbury, 330 miles, which falls into Broken Bay, and is navigable by vessels of 100 tons as far as Windsor, a distance of 140 miles. Others are the Shoalhaven, 260 miles; the Clarence, 240 miles, of which 70 are navigable; the Macleay, 190 miles; and the Richmond, 120. Some of these rivers in the winter season cause disastrous floods.

Geology and Mineral Resources.—In the southeast, east, and middle the prevailing rocks are Palæozoic (Silurian and other), with granite and other igneous rocks forcing their way to the surface, and in this region are chiefly situated the metalliferous deposits in which New South Wales is so rich. In the east Carboniferous and Permo-Carboniferous rocks also occur extensively, and to these belong the large and valuable coal fields of the country. Valuable sandstones also exist here in abundance. Cretaceous rocks extend over a wide area in the north and west, and the plains are mostly of Pleistocene origin. In connection with the granite, limestone, both granular and foliated, occurs in abundance, and besides being often hollowed out into stalactitic caverns, sometimes passes into a beautiful close-grained marble, as white as that of Carrara.

The coal fields extend over an area of 10,000 acres, with more than 91 mines. The state exports considerable quantities of coal to the west coast of North and South America. Copper ore of the richest quality and tin exist in large quantities, and iron is very generally distributed. Gold is found in all parts of the state; the value of the output in 1901 was $4,606,410, showing a considerable diminution; the total value of the output of gold for fifty years since its discovery in 1851, is $248,309,075. Most of the gold is sent to the mint for coinage. The combined value of the silver and lead output in the same year was over $6,500,000. Several varieties of precious stones have been found, notably opals.

Climate.—As the area of the state extends over 110 degrees of latitude and contains a good deal of elevated ground, nearly every variety of climate is to be found. In the north the climate is tropical, while on the table-lands severe frost is not uncommon. The interior plains are very dry, and severe droughts occasionally kill millions of sheep, but the coast districts have abundant rains. Though the hot winds of the warm season are annoying, they are not unhealthful, while storms and electrical disturbances are comparatively rare.

Forestry, etc.— About one fourth of the area of the state consists of forest lands, which in 1887 were taken under the care of the government by the creation of a Forest Conservation Department. For the Flora and the Fauna of the state, see AUSTRALIA.

Agriculture and Stockraising.—The absence of water renders much of the land useless for agricultural purposes, but a large proportion is devoted to pasturage and grazing. In some places artesian wells have been introduced with good results. There is no great breadth of highly fertile land away from the river banks; but the fertility of the land on the margins of rivers is exceptional. Where liable to inundation, however, the year's harvest may be swept away in a few hours. The area under cultivation in 1902 was 2,274,493 acres, and the crops included wheat, maize, barley, oats, rye, millet, potatoes, lucerne and artificial grasses, vines, orange-trees, sugarcane, some tobacco, etc. Dairy husbandry is becoming important, and butter is exported. Native fruits are neither numerous nor valuable, but the best of those of Europe are acclimatized. So well does the peach thrive, for instance, that farmers sometimes feed their pigs with the windfalls of their orchards. Other fruits include oranges, apples, pears, apricots, nectarines, cherries, plums, figs, grapes, melons, mulberries, gooseberries, currants, etc., and in the more northern parts the banana is abundant. The rearing of silkworms on the mulberry, which might be carried to an almost indefinite extent, has attracted attention. The grapevine is successfully cultivated, as well as the sugarcane; considerable quantities of wine, brandy, and sugar being made. The rearing of sheep (of which there are about 50,000,000 in the state) and cattle are the chief employments of the people.

Commerce and Industries.—Wool is the most

important article of export. The annual value of this export is not without fluctuation, but is again increasing. In 1901 the quantity of wool exported was 285,176,505 pounds, valued at $47,336,270. Other important exports comprise coal, silver ore, silver lead, gold, and coin, frozen and preserved meat, butter, tallow, leather, wheat, and flour. The principal imports are wearing apparel, sugar, tea, and hardware. The value of the total exports in 1901 was $136,755,620, of imports $134,641,090; 3,452 vessels of 4,196,408 tons entered, and 3,375 vessels of 4,324,826 tons cleared the ports.

The manufacturing industries are naturally not of much importance as yet, but they are already very varied, and help to supply a considerable share of the home demand. In 1901 there were 2,930 miles of railway open, nearly all constructed by government, which has spent about $195,000,000 upon the railways; 14,272 miles of telegraph line were in operation.

Government.— The constitution of New South Wales vests the legislative power in a parliament of two houses, namely the Legislative Council and the Legislative Assembly. The former consists of 21 members nominated by the crown, originally for the term of five years, but, subject to certain conditions, for life at the expiration of that period; and the latter of 125 members chosen by the same number of constituencies. Members of the Assembly receive £300 per annum, and they are entitled to travel free by rail or tram in the state. As electors require no property qualification there is virtually universal suffrage. The executive consists of a governor nominated by the crown, assisted by a council composed of state secretary, state treasurer, the ministers for lands, public works, mines and agriculture, education, and justice, the postmaster-general, and the attorney-general. The parliaments last for three years. Unless local acts supersede them the imperial laws are enforced. No enactment of the state legislature becomes law till sanctioned by the governor, and in some cases by the sovereign. The state sends 6 representatives to the federal senate, and 26 to the federal house of representatives. The state has taken measures for its own defense, and has a force, partly paid, partly volunteer, numbering more than 6,000, and including infantry, cavalry, artillery, engineers, naval brigade, etc.

Population.—On 30 June 1902 the estimated population was 1,395,600, of whom 731,620 were males and 663,980 females, chiefly British-born subjects. The aborigines numbered 4,287 and the Chinese 10,974. Sydney is the capital, and other urban centres are Broken Hill, Newcastle, Parramatta, Goulburn, Maitland and Bathurst.

Religion and Education.—There is no established religion. Among the religious sects the Church of England, Roman Catholics, Wesleyan and other Methodists, and Presbyterians hold the chief place. Education has been since 1880 controlled by a minister of public instruction. The public schools are classified as public primary schools, superior public schools in the chief centres of population, evening schools, high schools for boys, and high schools for girls. Primary education is compulsory, but not free, unless in cases where parents are unable to pay fees. Among the higher educational institutions are the Sydney Grammar School, and St. Paul's, St. John's and St. Andrew's colleges, and the Women's College, the colleges being all connected with the University of Sydney — an important institution, attended by between 600 and 700 students, and granting degrees in arts, medicine, science, and law. Technical education is administered by a special branch of the department of public instruction.

History.—New South Wales was discovered by Captain Cook in 1770, and founded as a penal settlement (at Botany Bay) in 1788, the convicts being employed in road-making and preparing the soil for agriculture. One of its early governors was the notorious Captain Bligh, who was deposed by the colonists in 1808. The most important events in its history since convict immigration ceased in 1840 are the establishment of representative institutions in 1843; the erection of Victoria into a separate colony in 1850; the discovery in May 1851 of extensive gold tracts; the rush to the diggings, with consequent great increase in population and prosperity; and the incorporation of the colony in the Australian commonwealth in 1901. The first railway, from Sydney to Parramatta, was opened in 1855. Among more recent events are the Sydney Exhibition held in 1879, and the Intercolonial Conference held at Sydney in 1883. The colony celebrated its centenary in January 1888, and a special series of stamps of elaborate design was issued in commemoration of the event. On 1 Jan. 1901 Sydney was the scene of the inauguration of the first governor-general of the new commonwealth, Lord Hopetoun. (See AUSTRALIA; AUSTRALIAN FEDERATION.) Consult: Griffin, 'New South Wales, Her Commerce and Resources' (1888); Hutchinson, 'New South Wales; the Mother Colony of the Australias' (1896).

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New Swe'den, or **New Swedeland,** a name given in the 17th century to land lying between the Dutch colony of New Netherlands and the English colony of Virginia. It included territory in what is now Delaware and New Jersey. It was settled in 1638 by a colony from Sweden; and in 1655 it was taken possession of by the Dutch.

New Tes'tament. See BIBLE.

New Testament Chronology, the chronology of the events related in the four Gospels, and the Acts of the Apostles, together with the dates of the Apostolic epistles. It may be outlined as follows:

The Birth of Jesus Christ.— According to the First Gospel Christ was born in the days of Herod the Great, whose death, as shown by concurrent testimony, took place 750 A.U.C. Josephus (Ant. XVII. viii. 1) tells us that this event occurred 37 years after he had been raised to the throne by the Romans 714 A.U.C. This would be 40 years before the Christian era as calculated by Dionysius Exiguus (533), who placed the birth of Christ in the year 754 A.U.C. Herod, therefore, died 750 A.U.C. Josephus says this event took place a little before the Passover, that is, in the spring of 750. The Nativity must be placed before this, and far enough before it to admit of time sufficient being allowed for the presentation in the temple, the visit of the Magi,

and the flight into and sojourn in Egypt, during which last period the death of Herod took place. It cannot then be placed later than the autumn of 749 A.U.C. (5–4 B.C.). The day and the month on which the whole Christian Church celebrates the event was fixed in the time of Chrysostom (about 386 A.D.) and has been retained ever since among both Eastern and Western Christians. There is no historic or scientific basis for the assignment. Some have held that as 25 December follows the winter solstice and is a period of the year at which the sun is rising day by day higher in the heavens with the new promise of spring, it was chosen arbitrarily, but fancifully, as a suitable time for celebrating the dawn of an era which brought fresh life to the human race. Others, with more reason, aver that as the Saturnalia extended in old Roman times from 17 December to 23 December, so the Christian festival was chosen at a date at which it may be thought suggestively to replace a pagan holiday during which slaves were for a few days free, sat at their masters' tables, and were served by them. Perhaps the Latin festival of the Brumalia, the feast "Invicti Solis" (of the "Invincible Sun") was intended to be superseded by the Christian festival of the "Sun of Righteousness." It may be observed in passing that as the supposed day of the Nativity would have occurred during the rainy season in Palestine it is extremely unlikely that shepherds would then have been watching their flocks by night in the open air.

Synchronistic Roman History.— (1) Saint Luke says that the census which took Joseph and Mary to Bethlehem took place while Quirinus (Cyrenius) was legate of Syria (Luke ii. 2). This legate, history tells us, was appointed to carry out the census 10 years later, 6 A.D. This had been made much of by Strauss and others, but Dr. A. W. Zumpt (see ZUMPT, AUGUST W.), the famous German philologist, in his tractate, 'Das Geburtsjahr Christi' (1869), has shown that Quirinus was twice governor of Syria, for the second time 753 A.U.C. (2) Another difficulty has been found in Saint Luke's date of Saint John Baptist's mission, which he says (Luke iii. 1) began in the 15th year of the reign of Tiberius. Tiberius did not become sole emperor until 14 A.D., but he began his reign as associate emperor with Augustus 12 A.D. (765 A.U.C.) which gives 780 A.U.C. or 27 A.D. for the date of the Baptist's ministry, when he would be in his 30th year, as was Jesus Christ (Luke iii. 23) and not 28 as if calculating from the sole reign of Tiberius. (3) The restoration of the temple by Herod the Great began 18 B.C. (John ii. 20). Forty-six years after that would be 27 or 28 A.D., which would be the commencement of our Lord's ministry in Galilee. The completion of the temple to its full magnificence was not accomplished until the day of Herod Agrippa II., 64 A.D. (Compare Josephus, 'Antiquities of the Jews,' XV. xi. 1). (4) The death of Herod I. (Acts xii. 23) occurred 44 A.D. (5) According to Tacitus, 'Annales,' xii. 52, and Suetonius, 'Claudius,' the Jews were expelled from Rome (Acts xviii. 2) by the emperor Claudius 52 A.D. (6) Festus (Porcius Festus), Acts xxv. 1, was appointed procurator of Judæa 60 A.D. (7) The persecution of Nero in which Saint Paul was put to death began 64 A.D. in the 10th year of that emperor's reign, while Gessius Florus was procurator of Judæa.

From the Birth of Christ to the Fall of Jerusalem.— At the time of Christ's birth C. Sentius Saturninus had been succeeded as legate of Syria by P. Quintilius Varus with whom, according to Dr. A. W. Zumpt, P. Sulpicius Quirinus was associated (Luke ii. 2). Judæa was made an imperial province under Augustus himself, who governed it by procurators, or stewards, on the deposition of Archelaus, 6 A.D. Herod Antipas continued to reign as vassal king of Galilee and Peræa, while Cyrenius (Publius Sulpicius Quirinus) carried out the census; enrolment of the population, or "taxing" (Luke ii. 2). Coponius appears to have been the first procurator and was followed, 9 A.D., by Marcus Ambivius. The appointment of Tiberius as colleague to Augustus at Rome in 12 A.D., corroborates the computation of years in Luke iii. 1. Annius Rufus was procurator in 13 A.D. and Valerius Gratus in 14 A.D. Tiberius was made sole emperor in the same year. Caiaphas was made high priest in 25 A.D., and Pontius Pilate appointed by Tiberius his procurator in Judæa 26 A.D. The last Passover of Christ, his Crucifixion, Resurrection and Ascension occurred in the early spring of 30 A.D., and the day of Pentecost on 26 May of the same year. The martyrdom of Stephen and the conversion of Saint Paul happened two or three years later, and Paul's first visit to Jerusalem took place 35 A.D. Caligula was emperor in succession to Tiberius in 37. He in turn was succeeded by Claudius in 41 A.D., the same year that Herod Agrippa was made king of Judæa and Samaria. Saul was introduced to the Christians at Antioch in 43 A.D. and Herod died in 44; in that year Cuspius Fadus was appointed by the emperor Claudius to be his procurator in Judæa. It was 45–46 A.D. that the famine raged at Jerusalem and Paul and Barnabas visited the brethren there with relief. Tiberius Alexander was procurator when the famine reached its height in 46 A.D. In 47 A.D. Paul and Barnabas made their first missionary journey together, and returned in the autumn of 49 to go to Antioch. The Council of Jerusalem took place the same year. In 50 A.D. Paul set out with Silas on his second missionary journey, in which year Claudius uttered his decree of banishment against all the Jews, sorcerers and magicians in Rome. In 51–52 A.D. Saint Paul visited Athens and Corinth, and from the latter city wrote his first and second epistles to the Thessalonians. He left Corinth early in 53 A.D. and arrived at Jerusalem in March, whence he proceeded to Antioch and wrote his epistle to the Galatians. Thence in the same year he started on his third missionary journey which ended at Ephesus, where he spent three years, 53–56 A.D. Nero succeeded to the purple in 54; the first epistle to the Corinthians was despatched 55, and in 56 Saint Paul left Ephesus and visited Macedonia and Corinth. From Macedonia he wrote his second epistle to the Corinthians, 56 A.D., and from Corinth his epistle to the Romans 57 A.D., after which he left Corinth for Jerusalem, where he was arrested in the temple and brought before the procurator Porcius Festus. He was taken to Cæsarea 57–59, appealed to Cæsar, as a Roman citizen, and was sent to Rome, 59 A.D. He was shipwrecked at Malta,

but reached Rome in March 60. While in prison (61–62 A.D.) he wrote his epistles to the Colossians, the Ephesians, the Philippians and Philemon. He was tried and acquitted early in the year 62 A.D., and made a missionary journey in Macedonia, Asia Minor, Crete and most probably Spain (63–66 A.D.). In the meantime he wrote his first epistle to Timothy and his epistle to Titus. He wintered at Nicopolis and in the spring of 66 A.D. was sent to Rome and underwent a second trial 67 A.D., wrote a second epistle to Timothy and was put to death by the sword in the last year of Nero's reign, in the 68th year of his age, and the 35th of his conversion. The first persecution of the Christians took place under Nero, who was succeeded by Galba 68 A.D. Under Vespasian who took the purple 68 A.D., the Romans made war on the Jews under the leadership of Titus, son of and eventually successor to Vespasian, and the destruction of Jerusalem took place 70 A.D. Consult: Lewin, 'Fasti Sacri' (1865); Ramsay, 'Saint Paul the Traveler and Roman Citizen' (1896); Ideler, 'Handbuch der Mathematischen und technischen Chronologie' (1825); Wieseler, 'Chronologische Synopse der vier Evangelien' (1843; English translation, London 1878); 'Chronologie des apostolischen Zeitalters' (1848).

New Testament Theology, that branch of theological science which has for its peculiar task to state, arrange and compare the theological doctrines and conceptions found in the New Testament. While it might be combined with Old Testament theology under the name Biblical theology, yet the differences in dates, language, style and contents between the Old Testament and the New are such that their respective theologies have usually been treated separately, although their methods are necessarily identical. It is also possible to state the doctrinal teachings and theological conceptions of any individual author, and even those found in any single work of any author, and such contributions to Biblical theology have often proved exceedingly valuable; but the historic unity of the New Testament renders it practically important that the teachings and views of the various New Testament authors should be so presented and compared as to give but a single impression of the whole. Such works as have merely placed these several views side by side, give only an incomplete and unsatisfactory treatment of the science.

Character and Relations.— New Testament theology is strictly a historical science, neither attacking nor defending the conceptions which it finds, but merely stating, arranging and comparing them. As a historical science it is connected with Ecclesiastical History, and might be considered the first volume of the History of Christian Doctrine. But it demands such a mastery of the results of the sciences of Isagogics and Exegesis on which it depends, that it is usually associated rather with interpretation, of which it might be reckoned the crown. It also presupposes and builds upon Old Testament history and the history of the world in New Testament times, and in its turn it provides much material for Dogmatics.

History.— The name Biblical Theology, which had earlier been employed to designate such a system of dogmatics as was based upon the Scriptures rather than upon either creeds or reason, was first used in its modern sense by Gabler in 1787, since which time the science in its application both to the Old Testament and the New has gradually developed. The first American work in the sphere of New Testament theology was published in 1870, and the first lectures in any American theological school are said to have been given in 1883. Since then it has received a steadily increasing amount of attention.

Difficulties.— The task of the New Testament theologian presents peculiar difficulties. It is impossible for him to increase the amount of the material with which he deals, however helpful for supplementing or verifying his conclusions such increase might be. All expression of thought is defective, and most of all is this true in theology, where upon words derived from the earthly and the human is laid the burden of declaring the heavenly and the divine. Further, the teachings to be considered come in a form due to ancient ages, tongues and conditions, and accordingly accurately and adequately to restate in modern form thoughts which have thus come down in ancient garb cannot be easy. Then, since with few exceptions the theological thoughts contained in the New Testament found expression solely for ends then immediately practical, it follows that the statements are often partial and incomplete, and the emphasis upon certain aspects of truth is only relative, and these statements must be read with constant reference to the thought of the age and the details of the local situation to which they belong. Hence only with difficulty can the incomplete expressions of practical religious thought be fitted together to reconstitute such systems of doctrine as may be credibly attributed to the various New Testament authors. Yet this task has been so successfully accomplished that the religious thoughts and conceptions of the New Testament authors have been restated with a good degree of trustworthiness.

Grouping of the Books.— There is general agreement as to the grouping of the New Testament books according to the types of thought which they exemplify. The teaching of Jesus demands attention first, if not as a standard for the rest or as of superior authoritativeness, as at any rate prior in time to the other New Testament teachings and as presupposed by them. The records of Christ's teaching are necessarily subdivided into the Synoptic and Johannine reports. The second group of documents represents the type of Christian thought which developed among Christians of Hebrew descent, and consists of the first part of the book of Acts, the letters of James and Jude, the two letters of Peter (which, however, show that there had been a development considerably beyond the primitive conceptions current in the church), and such traces of apostolic or other early doctrine as may be noted in the Gospels. In the Pauline section the Epistles attributed to this Apostle fall naturally into four groups, which differ in theme and matter as well as in date and style. If any of these letters should not be held to be Pauline in origin, they are yet so distinctly in harmony with Paul's views that this would not change their place in the general classification, while the Epistle to the Hebrews is a natural pendant to the writings of Paul. The fourth

group of New Testament writings consists of the books attributed to the Apostle John, consisting of his letters, of so much of the Fourth Gospel as is not the teaching of Christ and of the Revelation.

Kingdom of Heaven.— In the Synoptic reports Jesus begain his teaching by echoing the proclamation of his forerunner, John the Baptist: "The kingdom of heaven is at hand." While from the beginning of this preaching he seems to have recognized that he himself was to be the head of the promised kingdom, yet his own conception of the character and work of the Messiah was so different from the popular conception, so much loftier and purer, that he could not present himself at once and unreservedly as the Coming King, for, had he immediately and unmistakably advanced his claim, political enthusiasm would have forestalled religious faith, and even on the part of true followers earthly ideals, expectations and plans would have obscured and neutralized heavenly, as, indeed, to some extent actually occurred in spite of caution and reserve. The name kingdom of heaven or of God, however, remained prominent throughout the teaching of Jesus, but in the latter part of it with an altered meaning. Convinced that he had nothing to hope from the leaders of the nation or the people whom they controlled for the kingdom of prophecy, which was intended to reach its spiritual ends through a local, national, political organization, Jesus necessarily substituted individual submission to the sovereignty of God, and retaining the name without the form, the kingdom which he strove to establish became in his teaching universal and spiritual.

Repentance and Faith.— While the state of individuals and society which he would establish thus took a new form in consequence of his rejection by his nation, the conditions of entrance, as well as the ultimate ends to be attained, remain unchanged. The first demand upon each and all is for repentance. As a morally transformed and thus fit nation should have met its King come at last, so only a soul turned from evil to good can receive the spiritual blessings which Jesus bestows. More and more clearly as antagonism gave renewed opportunity, Jesus denounced sin and demanded from all without exception penitence and reformation, although in serene consciousness of sinlessness he ever held himself apart from all confession of any evil on his own part.

The Supreme Place of Christ.— With repentance as a reversal of moral tendency must come acceptance of himself as Supreme Master and absolute submission to him. His demand for self-denial is a demand for complete self-abjuration; his invitation, "Come unto Me," is not only an invitation, but no less the presentation of himself to the world as the one fountain of spiritual blessing; to receive him he says is to receive God himself, and personal service to him is regarded as proof of sins forgiven; devotion beyond all other loves is required, and so absolutely supreme is the relation of the soul to him that on confession or denial of him he makes the issues of the future life to hinge. This relation is made still more significant by the few but clear and emphatic teachings as to his death, by virtue of which as a ransom salvation would be rendered possible for men.

God's Love.— The fourth element in the teaching of Jesus which the Synoptists record relates to God. This teaching is almost never metaphysical, only religious and practical. The chief thought in it is God's love. This love, which exceeds that of any earthly father for his child, is shown in the rising of the sun on the evil and the good alike and the coming of the rain on both just and unjust, and in care for sparrows, ravens and lilies, and finds its crown of perfectness in kindness to the unworthy. The climax of this teaching appears in the parables about rescue of the lost, in the third of which, usually called the "Parable of the Prodigal Son," this tender love of God is so winningly presented that it has given a very common name for the love of God, so that all Christ's teaching is said by many to be dominated by the thought of God's "Fatherhood," a view which should be so held as to include the other conceptions of Jesus as to God's special relation of fatherhood to believers, and his unique fatherhood to Christ himself.

Johannine Teaching of Jesus.— In the Gospel of John the teaching of Jesus is presented with a superficial dissimilarity at first sight striking, but in essential consistency with the Synoptic reports. As the place of the ministry reported is largely the city of Jerusalem instead of the open country of Galilee, as we have often hostile Pharisees for interlocutors instead of disciples for reverent auditors, so of the four chief elements of the Synoptic teaching, the Kingdom, Repentance and Faith, his own unique supremacy and the fatherly Love of God, the kingdom is scarcely mentioned, repentance is ignored and faith given a different aspect, and the paternal kindness of God is much less emphasized, while Jesus insists even more upon his own preeminence and shows it in new lights.

Deity of Christ.— The two foci of the teaching reported in the Fourth Gospel are, as might be expected from the author's own statement of his purpose as stated at the end of his writing, the deity of Christ and the duty of Faith. All the discourses in the Gospel are selected with a view to showing Christ's self-revelation to the world on the one hand and to his disciples on the other. While his Messiahship is not here emphasized, there is presented instead a conception of a sonship based on a unique unity with God, combined with hints of pre-existence, suggestions and implications of divinity and, finally, a welcome by Jesus to the assertion of his deity.

Faith.— The proper relation on the part of his disciples, and, indeed, of all men, toward this personality who thus presents himself is not mere acceptance of statements about him and of truths relating to him, but further spiritual union with him by entering into relations to him, appropriation, in a word.

Judaic Teaching.— The earliest Apostolic teaching and the type of doctrine which seems long to have prevailed among the churches which were of Judaic origin and cast, was only to a very slight degree dogmatic, and brought no enlarged or corrected doctrines touching the nature of God or the character of men. Indeed, no New Testament authors ever approach these themes as if intending to communicate fresh truth, but rather to confirm and apply truth already commonly apprehended. The chief thought of the primitive church was the place and rank of Jesus, and here even the earliest teaching of the Apostles is developed in many

respects beyond that of Jesus himself, a fact which is not surprising when it is remembered on the one hand that we cannot rightfully suppose that he exhausted the contents of his consciousness in even his frankest disclosures to his disciples, and on the other hand he himself promised that the guidance of the Spirit whom he would send from God would result in larger knowledge than his own instructions had brought. While the name of the kingdom is dropped at once and permanently out of use, at the same time the Messiahship of Jesus is asserted, and it is insisted upon that by his coming forth from the tomb re-embodied, which was the resurrection to which his Apostles testified, his Messiahship and Lordship were fully confirmed. While it was constantly recognized that Jesus was no less man than other men, he was regarded as distinguished from other men, not only by his character of unique holiness, but also by his Messianic rank which gave him universal sovereignty and Lordship, and, further, he was given the title Lord, which had been a familiar substitute for the most sacred of all the divine names. Theological discussions as to the nature, basis and conditions of salvation are not to be expected in such documents as represent Judaic Christianity, but it is plain that it was thought of as release alike from the consequences and the power of sin, provided, especially in the former aspect, by the death of Christ, and to be obtained by repentance.

Pauline Teaching.— The teachings of Paul are much fuller than those of the other Apostles, and in many places, owing to the doctrinal controversies which evoked them, they approach somewhat closely to dogmatic form, while such was the diversity of the occasions out of which the letters arose and of the situations of their first readers, that they cover nearly the whole field of Christian thought. Paul's conceptions of the nature and attributes of God, of his sovereignty and his love, and of the ruined condition of sinful men, while frequently brought out with great distinctness, were in no sense peculiar to himself. His special topics are, besides the rank of Christ, his saving work, the duty of man in relation to it, and the activity of the Holy Spirit in completing it. While Paul implies a general knowledge of the life and teachings of Jesus, he looked to Christ as far transcending in nature and rank what might be inferred from these facts. In Paul's mind the unique fact of the resurrection of Jesus at once certified to his unique nature and relation to God and opened to him the way to supreme exaltation and universal dominion which would become fully his when he should return in glory to earth. He shared the divine essence; in his activities before his birth of a woman he created the universe and continues to uphold it, and to him worship is rightfully paid. The life and especially the death of Jesus were a part of the divine plan for the rescue of men from the state into which their sin had brought them. The death of Christ was clearly set forth by Paul as provided in the love of God as a basis indispensably prerequisite for the favorable treatment which he gives to every penitent: the blood of Christ was to Paul the ransom and propitiation by virtue of which redemption and reconciliation are secured for men. Paul was led by controversy to insist with peculiar urgency that Divine forgiveness and favor are conditioned on faith alone, that is, that salvation does not primarily depend on the behavior of a man, but on his acceptance of God's gracious gift, but while faith alone is the condition of entrance on the Christian's state, yet the Christian life in its ideal involves nothing less than the perfect performance of every duty, and this ideal is practically attained only by the aid and power of the Holy Spirit, whom he regards as possessing personal, divine attributes, who is imparted to every believer and permanently dwells in him.

Teaching of the Epistle to the Hebrews.—The letter to the Hebrews makes no contribution of special novelty to the theology of the New Testament. While somewhat unlike the thought of Paul in that it presents the Mosaic system as helpfully preparatory to Christianity which supersedes it, the views which it presents of the transcendent rank and sacrificial death of Christ are in fullest harmony with Paul's. That Christ is a "high priest," that is, a representative of men before God, and that faith is an unyielding grasp on the invisible, are thoughts which are peculiar to the author of this Epistle.

Johannine Teaching.— The teachings of John relate themselves proportionally more to God himself than those of any other New Testament teacher, but his conceptions of the deity, like theirs, are mainly dynamic and ethical, rather than metaphysical. His thought seems to sum itself up in three words, life, light and love, which suggest that God is the constant source of all power and joy; that he is spotlessly holy and tends unceasingly to manifest himself as such in and to his universe, and that his most central, essential and characteristic attribute is kindness and beneficence, unceasing and all-embracing. In the teaching of John the eternal Logos, or expression of God, became incarnate in Jesus, and thus presents God to men; and in turn by his death he became the "propitiation" in virtue of which forgiveness is promised on condition of penitence and confession. The privilege and duty of Christians is fellowship with God, that is, by refraining from all sin to share his spotless holiness.

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New Theology, or **New Divinity, The.** See EDWARDS, JONATHAN; PRESBYTERIANISM; NEW ENGLAND THEOLOGY.

New-Thought is an idealistic or metaphysical movement in this country. It began about 20 years ago. It is a direct successor of New England transcendentalism, but is much more practical and democratic. The older idealisms were seclusive, but this one is preached and practised on the highroads and carried into the minutiæ of daily life, often assuming the forms of religion and philosophy. It boasts of being the greatest healer the world has yet seen

and scorns the idea of being mere speculation. It is claimed that New-Thought will not create any new religion or creed and that it will not formulate any new system of metaphysics. As regards religions, it is said by the representatives of New-Thought, that they are not desirable, because they are based on will, not on thought, and because they demand obedience. As regards metaphysics, no system is wanted, because life and thought cannot be confined in a system. The world needs illumination and freedom, not limitation.

The first apostles of New-Thought were P. P. Quimby of Portland, Maine, Dr. W. F. Evans, and their immediate disciples. The first preached it orally, the other by the pen. None of these, however, are its parents in any sense, nor are they quoted as authorities by any present-day followers or teachers. New-Thought is the modern expression of an inherent self-affirmation of the soul as old as the soul itself. New-Thought self-affirmation is intensely individualistic and has found its philosophy in Emerson's "Self-reliance." In the Emersonian extreme and in Tennyson's

> Self-reverence, self-knowledge, self-control,
> These three alone lead life to sovereign power,
> — *Œnone.*

may be found its First Principles. New-Thought people, however, identify the self with the "Oversoul" and commonly prefer to quote the Biblical "*I am* (that I am)" as their motto and foundation. The revealed secrets of the "I am" are to be read upon every page of their hundred and one serial publications. These "revelations" resound with mystic refrains of the Oriental *tat twam asi*, "That (namely the 'Universal Self') art Thou!" and they run into the high notes of Promethean self-deification and rebellion. "The Song of the Soul Victorious" is of freedom, of our being centres; of concentration and self-assertion, human divinity, ideal suggestion, the souls' prerogative to rule and of "vibrations" which are the redemptive forces of existence. In strong contrast and as a jarring note in this solemn and highflowing song one reads immediately afterward that the publisher does healing, "absent treatment, a specialty," at so much or so much per contract, if the reader promptly forwards the money.

New-Thought ontology teaches "oneness of life," that "all life is one," but the student searches in vain for any scholastic definition of these axiomatic teachings as also for the theological dogma "God is omniscient, omnipotent and omnipresent." This last, the omnipresence of God, is taught to the exclusion of all other attributes. The bearing of these two doctrines leave, however, no doubt about their being inherently pantheistic in character, and implying a pantheism in the direction of the Hegelian pan-logism. To New-Thought life, God and all other categorical terms are swallowed up by Mind or "the limitless self." New-Thought epistemology is in harmony therewith: "all knowledge is one," it declares with much force, but without argument, the popular understanding being that human knowledge is one with divine knowledge.

New-Thought is often confounded with Christian Science, but their difference can clearly be seen by their cosmology. The latter holds the Oriental doctrine that the world and its things are illusory, products of "the mortal mind," but New-Thought asserts the reality of the world and considers it an expression of God, the two being related as cause and effect. The central doctrines of New-Thought lie in psychology. They consist in asserting the supremacy of mind over all other energies and in identifying it with the perennial stream of energy which permeates existence at large. Our mind is identical with the supreme mind, it makes us what we are and creates our conditions and environment; by inherent love it overcomes all hatred, malice and sickness; by inherent law it establishes itself as the world's law and by inherent order it rules everywhere. It keeps itself alive in love, law, and order by constant affirmation of itself: "I am, that I am!" In ethics, the New-Thought is of a decided optimistic tendency. Its programme is the Emersonian "don't bark against the bad, but chant the beauties of the good." Evil is not real, but only an imperfection which illumination dissolves. New-Thought is not iconoclastic, but fulfils the ends of creation in "peace and good will." If others do not know Reality and only worship "an unknown God," New-Thought people do not think it right to use violence or even persuasion; growth and experience will bring truth.

New-Thought is intensely practical. It professes to heal sickness and to remove the sting of death. Sickness is error and is cured by right and wholesome thinking, and death is but a transition, a "passing out" into another condition. If we always stood fast in right thinking we should never die, but simply transform ourselves.

New-Thought "circles of healing" are very common. They are found in every State in the Union, and in most cities followers of the cult can be found. It is estimated they exist by the million. The cult and its teachings have spread to Canada, England, and many places on the continent, especially France and Germany. The circles are not churches, but "bethels" or "houses of thought" for instruction and meditations. Services on Sunday usually begin with the singing of "Omnipresence, Omnipresence, Omnipresence, manifest Thyself in me!" and are followed by a few minutes of meditation for the concentration of mind, before the discourse is given. Speakers are chosen without regard to creed or race, etc. Their main qualification lies in their experience of oneness with the Great All. At the circles rooms are set apart for daily noon-hour meditation. In the rooms are also private classes for instruction, etc. The circles are maintained by voluntary contributions, but no teachers, excepting private class teachers, are paid.

New-Thought healers are many, but New-Thought teachers are many more. Experience has shown that no man or woman can heal more than a very limited period of their lives. When they can heal no more, they teach others the method. The methods of healing run through the whole scale of impressing the "new" thought by suggestion, hypnotism, faith, or simple rationality. Healing is done also by "absent treatment" or telepathy and is paid for in hard cash. "Healing and doing good" as Jesus did is unknown in New-Thought.

A New-Thought convention was held in Chicago, 17–20 Nov. 1903, attended by many

thousands. The following «progressive» declaration of principles was adopted:

1. The New-Thought is the new interpretation of universal and eternal Truth.

2. God — Universal Spirit, Mind, Principle — is omnipresent, omniscient, and omnipotent.

3. Man is the individual expression of God, possessing inherently and capable of manifesting all the aspects of God.

4. Man unfolds to a continuously expanding consciousness and manifestation of these aspects, through right thinking and right living.

5. The consciousness of harmony is Heaven, here and now; in the realization of which abide peace of mind and health of body.

6. The essentials of the New-Thought are suggested by the words — Unity, Co-operation, Freedom, Brotherhood, and Individuality.

C. H. A. BJERREGAARD.

New Ulm, Minn., city, county-seat of Brown County; on the Minnesota River, and on the Minneapolis & St. L. and the Chicago & N. W. R.R.'s; about 80 miles in direct line west by south of Saint Paul, and 25 miles west by north of Mankato. It was settled in 1857 by a German Land Company, incorporated in 1870, and chartered as a city in 1876. It was the scene of an Indian massacre in 1862. It is in a productive agricultural region in which there is considerable attention given to stock-raising. Its chief industrial establishments are flour mills, breweries, cigar factories, a creamery, a cooperage, machine-shops, a pottery, brick and lumber yards, and grain elevators. The mills have about 175 employees; the cigar factories, about 70; the breweries, 75; and the brick yards, 50. It has an extensive trade in farm products and live-stock. There are five churches, and the educational institutions are public and parish schools, Dr. Martin Luther College, Saint Michael's Academy, a public school library, and the Turnverein Library. The three banks have a combined capital of $170,000, and the annual business is about $15,000,000. The government, under a revised charter of 1891, is vested in a mayor, who holds office two years, and a council. The electric-light plant and the waterworks are owned and operated by the city. The majority of the inhabitants are German or of German descent. Pop. (1890) 3,741; (1900) 5,403.

PHILIP LIESCH,
Editor, 'Journal.'

New West'minster, Canada, a cathedral city, the former capital of British Columbia, on the Fraser River, about 15 miles from its mouth. It is connected with the rest of Canada by the Canadian Pacific Railway, and with the United States railway system by a short branch; an electric railroad 8 miles long connects it with Vancouver. The town has electric lighting, municipal waterworks, and public parks. It is the headquarters of the river traffic of the province. Salmon-fishing and canning are its chief industries; there are also saw-mills and a considerable trade in lumber. Pop. (1901) 6,499.

New World, The, a name applied at a very early period to the Western Hemisphere. Ferdinand inscribed on the tomb of Columbus, «To Castile and to Leon, Columbus gave a new world.»

New Year's. The observance of the first day of the year is of very ancient origin. The Romans on this day were accustomed to exchange greetings and make presents. New Year's under the Cæsars was a great source of profit to the emperor and quite burdensome to his subjects. The church at first prohibited Christians from having anything to do with it, but at last made the day a Christian festival. Before 1752 the year began on 25 March. The change in the calendar was made in that year for Great Britain by an act of parliament. In Persia the year is supposed to begin on 21 March, and the day is one of universal rejoicing. Men who never take a bath or get shaved at any other time do so on that day, and the barbers reap a rich harvest in consequence. Our Teutonic and Saxon ancestors found it impossible to celebrate the day without a wassail bowl. Pledges were drunk from it, and from this came the name, wassail being derived from the Saxon «wasshail»—«to your health.» The bowl was so big that when a man rose to drink from it he had to use both hands to raise it to his lips, and such were the gentle manners of the times that a friend always stood by with drawn sword while he did so to prevent his being stabbed.

New Year's is a great day in the courts of European royalty. All monarchs begin the day by going to church, and much of the time that remains is devoted to the reception of the great dignitaries of church, state, army and diplomatic corps. At Saint Petersburg and Moscow, where New Year's is celebrated according to the rite and calendar of the Greek Church, the favorite form of luxury appears to be bric-a-brac. Under the pretext of sending bonbons, men pack the candies in the most exquisite caskets of Saxe and Sevres porcelain, or else in boxes made of that beautiful enameled silverware for which Russian jewelers are so famous.

In Japan the new year is a season of much festivity and innocent mirth. Every portal is decorated, and each object of which the decoration is composed has a symbolic meaning. The usual form of the decoration is a green arch. On the right is placed a small pine tree with a reddish stem and on the left one with a black stem. Fancy has attributed to the light one a feminine and to the dark one a masculine sex. Also this hardy tree symbolizes a stalwart age that has withstood the storms and struggles of existence. Close to the pines on either side are set graceful stems of bamboo, which, rising erect with succession of rings, form a fit symbol of hale life and fulness of years. The distance between the pines — about six feet — is spanned by a grass rope, sufficiently raised to admit of passage beneath it. This, according to its symbolic purpose, debars all unclean and evil things from crossing the threshold. Among the Chinese the day is the greatest festival of the year, and in France it is observed more than Christmas.

According to an old superstition, ill fortune is sure to attend the family whose first visitor on New Year's day is a female, while a lady's first caller should be a dark man, as a fair one is thought to be a harbinger of evil. A custom similar to that of making New Year's calls is the sending of cards to one's friends on the day. In this way one can keep up acquaintances

that might otherwise die out merely from lack of time for great sociability. After the restoration of the Bourbons it became fashionable in Paris to send bonbons on New Year's day, and in 1822 a thousand tons of them were sold in the two days preceding the festival.

The day was more or less observed among the American Indian tribes. The Moqui celebration, called So-yal-u-na, is largely a presentation of a singular and elaborate mythic drama, divided into two parts, in which offerings are made to effigies of the great plume headed serpent, the enemy of the sun, followed by a sun dance, in which the conflict between the sun and the inferior hostile gods is admirably portrayed by Moqui men personifying the various deities.

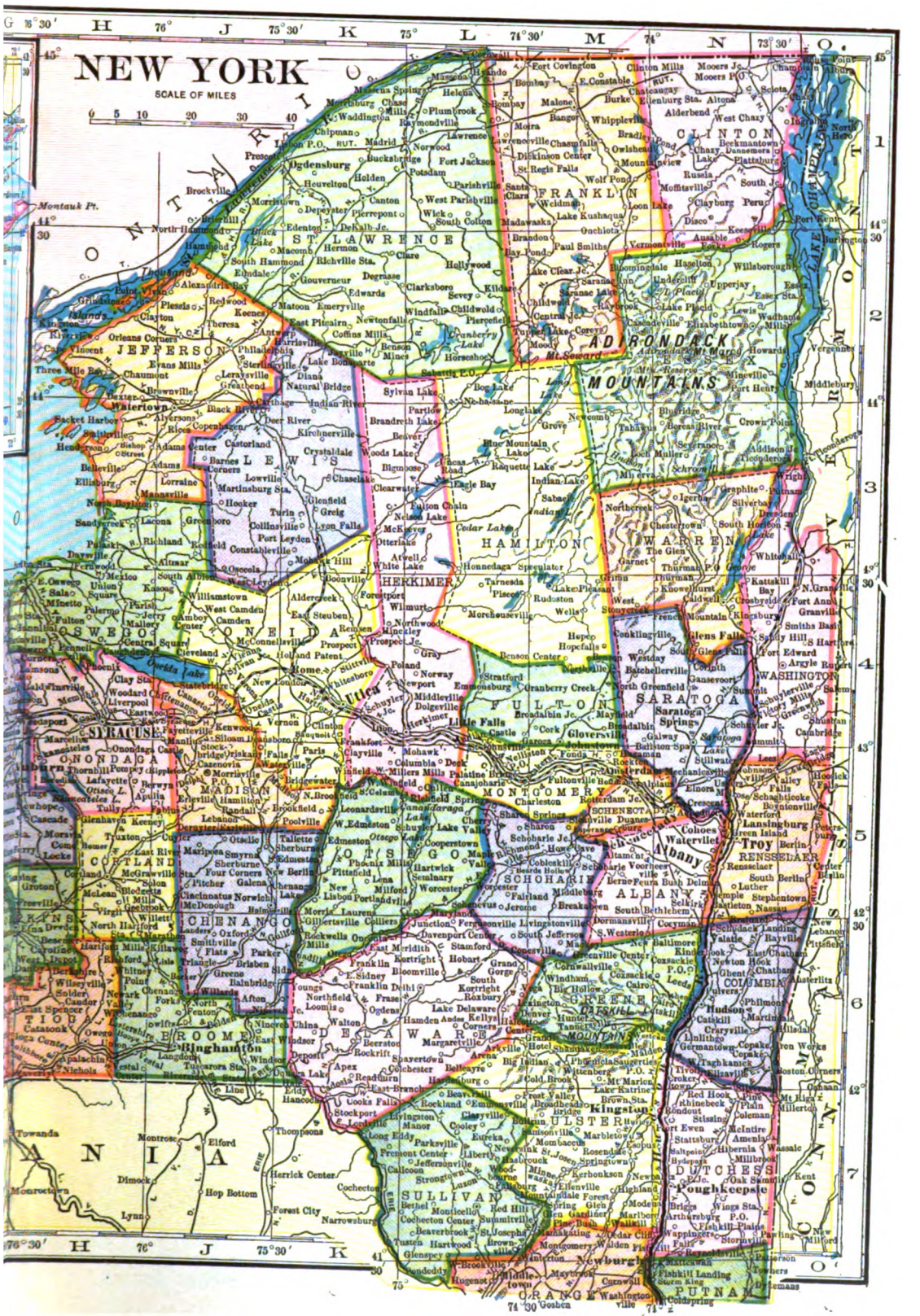
In the United States it has always been the custom of the Presidents to receive on New Year's day. In 1790, when New York was the seat of government, Washington held a reception between the hours of 12 and 3 and was visited by all the home and foreign dignitaries. He expressed the hope on that occasion that whatever change might take place in the manners and customs of the city the observance of New Year's day might never be given up. In New York and other cities there are services in many churches and receptions in many clubs and drawing rooms. The formal custom of receiving New Year's calls has nearly become obsolete in our larger cities, it having been superseded by the regular afternoon and informal evening receptions, to which gentlemen take more kindly than to the old-fashioned New Year's party. The good old Knickerbocker custom is still maintained by some families. Some give formal dinners, and in the country, carriage loads not infrequently go round from hosue to house making merry calls, picking up additions to the party and finally ending with supper at some hospitable house and in an evening with games, refreshed by apples, roast chestnuts, plum cake and sweet cider. The day was not observed in Colonial times with the formality which has marked its observation in later years. After the Colonies had adjusted business affairs to the new date, the first of January grew in importance and in course of time became a legal holiday. See CALENDAR.

New York (the "Empire State"), a State in the northeastern part of the United States; lying between lat. 40° 30′ and 45° 1′ N. and lon. 71° 50′ and 79° 46′ W.; bounded on the north by Lake Ontario, Saint Lawrence River, and Canada; on the east by Vermont, Massachusetts, and Connecticut; on the south by the Atlantic Ocean, New Jersey, and Pennsylvania; on the west by Pennsylvania, Lake Erie, and the Niagara River. Lake Ontario is west of the northern part of the State, and New Jersey is west of the southern part of the State. Lake Champlain is on the boundary between New York and Vermont. The extreme length of the State from north to south is 312 miles; and from east to west 326 miles, or 412 miles including Long Island. The area is 49,170 square miles, of which 1,550 square miles are water surface. The State contains 30,476,800 acres of land, of which 22,648,109 are in farms. It ranks in size the 26th among the States of the Union.

Topography.—About one half the boundary of the State, exclusive of Long Island, is water. The chief inlet is New York Bay. Long Island, southeast of the mainland of the State, is separated from Connecticut by Long Island Sound; southeast of the mainland of the State, is separated from New Jersey by Staten Island Sound, Arthur Kill, and Newark Bay. Both these islands have inlets along the coast, some of which are good harbors. Along the shores of Lake Champlain and Lake Ontario there are a number of small inlets. In the Saint Lawrence River, where it leaves Lake Ontario, are numerous islands, many of them well wooded and beautiful. The group is called "The Thousand Islands." These islands are favorite summer resorts. Long Island on the south is a part of the coastal plain; the greater part low; the highest elevation is 382 feet. The eastern part of the State is mountainous, the ranges extending generally northeast and southwest. The central and western parts of the State are rolling or level land. The mountains belong to the Appalachian system. In the northeastern part of the State are the Adirondacks. Mount Marcy, the highest elevation in the State, 5,344 feet, is a peak of the Adirondacks. There are several peaks from 2,000 to 4,000 feet. These mountains are covered with forests, largely pine. The Adirondacks extend along Lake Champlain south to the valley of the Mohawk and west nearly to Lake Ontario. They are noted summer and health resorts; more people visit the Adirondacks annually for health or pleasure than any other outing place in the country. These mountains toward the south become ranges of hills which slope to the Mohawk in the east and to the lake shore plain on the west. South of the Mohawk Valley the land again rises to what is known as Catskill Mountains. Some of the peaks amid the Catskills are fully 3,000 feet high. Slide Mountain, the highest peak, is 4,205 feet above the sea. The Shawangunk Mountains, more a plateau, are south of the Catskills. The highest part of the plateau is in the west back from the Hudson from 1,000 to 2,000 feet. On the southeast and north is a limestone escarpment, Helderberg Mountain, which in some places attains a height of several hundred feet. In the western part of the State and parallel with Lake Ontario are two well defined terraces each about two hundred feet in height. The Lower Terrace, called Lake Ridge, extends from the Genesee River to the Niagara, and is from three to eight miles distant from Lake Ontario. This Lake Ridge marked at one time the southern short of Lake Ontario, when the outlet of the lake was by way of the Mohawk Valley. The Upper Terrace, called Mountain Ridge, is about thirty miles inland, and extends east and west almost parallel with Lake Ridge. The highest part of the plain or plateau portion of the State is in Otsego County, where it attains the altitude of 2,300 feet. "Rock City," Allegany County, upon a summit 1,400 feet above the surrounding valleys, consists of a tract of 40 acres covered with rocks broken into layers forming streets and alleys.

Hydrography.—The waters of all the rivers of the State finally enter the Atlantic Ocean. They reach the ocean by way of the Saint Lawrence, Hudson, Susquehanna, Delaware, and Mississippi rivers. The great valleys of the State are the Hudson and Mohawk valleys,

A B C D E F G
1 2 3 4 5 6 7
73° 30′ 73° 72° 30′ 72°
74° 30′ 74° 73° 30′ 73° 72° 30′ 72°
79° 30′ 79° 78° 30′ 78° 77° 30′ 77°
43° 42° 41° 39° 30
CONNECTICUT
NEW JERSEY
LONG ISLAND SOUND
ATLANTIC OCEAN
ONTARIO
PENNSYLVANIA
LAKE ERIE
572 feet above mean sea level
New Haven
Bridgeport
Stamford
Danbury
Norwalk
Middletown
Hartford
Waterbury
Meriden
New Britain
Willimantic
Norwich
New London
Saybrook
Greenport
Sag Harbor
Montauk
Riverhead
Patchogue
Babylon
Hempstead
Jamaica
Flushing
Brooklyn
Queens
Nassau
Suffolk
Staten Island
Jersey City
Newark
Paterson
Elizabeth
Trenton
Morristown
Dover
Hackettstown
Somerville
Plainfield
Metuchen
East Millstone
New Brunswick
Perth Amboy
Long Branch
Asbury Park
Toms River
Atlantic City
Cape May
Sandy Hook L.S.
Scotland Wreck L.S.
Fire Island L.S.
Same Scale as Main Map
TORONTO
Brampton
Hamilton
Streetsville Jc.
To Toronto
To Port Hope
To Kingston
Niagara Falls
Fort Niagara
Youngstown
Lewiston
Tonawanda
Wheatfield
Lockport
Medina
Albion
Brockport
Rochester
Fairport
Pittsford
Canandaigua
Geneva
Seneca Falls
Auburn
Cayuga
Batavia
Attica
Alexander
Corfu
Akron
Buffalo
Hamburg
Orchard Park
East Aurora
Warsaw
Wyoming
Java
Silver Creek
Dunkirk
Fredonia
Westfield
Brocton
Portland
Ripley
Jamestown
Chautauqua
Chautauqua L.
Mayville
Panama
Clymer
Warren
Oil City
Franklin
Titusville
Meadville
Corry
Erie
Conneaut
Ashtabula
Geneva
Painesville
Cleveland
Elyria
Lorain
Sandusky
Fremont
Toledo
Bowling Green
Findlay
Lima
Wapakoneta
Sidney
Piqua
Troy
Dayton
Springfield
Xenia
Zanesville
Cambridge
Wheeling
Steubenville
Pittsburgh
Washington
Uniontown
Connellsville
Greensburg
Johnstown
Altoona
Bedford
Somerset
Cumberland
Hagerstown
Chambersburg
Gettysburg
Harrisburg
Lancaster
Reading
Pottsville
Allentown
Bethlehem
Easton
Scranton
Wilkes-Barre
Hazleton
Williamsport
Lock Haven
Bellefonte
State College
Tyrone
Huntingdon
Lewistown
Mifflin
Sunbury
Shamokin
Mount Carmel
Pottsville
Tamaqua
Mauch Chunk
Stroudsburg
Milford
Honesdale
Carbondale
Susquehanna
Binghamton
Elmira
Corning
Hornell
Olean
Salamanca
Jamestown
Dunkirk
Erie
Meadville
Franklin
Oil City
Titusville
Warren
Kane
Bradford
Coudersport
Wellsboro
Mansfield
Towanda
Tunkhannock
Montrose
Carbondale
Honesdale
Port Jervis
Middletown
Newburgh
Poughkeepsie
Kingston
Hudson
Albany
Troy
Schenectady
Amsterdam
Gloversville
Johnstown
Saratoga
Glens Falls
Whitehall
Ticonderoga
Plattsburg
Malone
Ogdensburg
Massena
Watertown
Carthage
Lowville
Boonville
Utica
Rome
Oneida
Syracuse
Auburn
Cortland
Ithaca
Watkins Glen
Hammondsport
Penn Yan
Canandaigua
Geneva
Seneca Falls
Auburn
Cayuga
Oswego
Fulton
Pulaski
Sandy Creek
Adams


NEW YORK
SCALE OF MILES
0 5 10 20 30 40
JEFFERSON
LEWIS
ST LAWRENCE
FRANKLIN
CLINTON
ESSEX
ADIRONDACK MOUNTAINS
HAMILTON
WARREN
WASHINGTON
SARATOGA
FULTON
MONTGOMERY
SCHENECTADY
ALBANY
RENSSELAER
HERKIMER
ONEIDA
OSWEGO
ONONDAGA
CAYUGA
SENECA
MADISON
CHENANGO
CORTLAND
TIOGA
BROOME
DELAWARE
SCHOHARIE
OTSEGO
GREENE
COLUMBIA
RENSSELAER
LAKE CHAMPLAIN
LAKE ONTARIO
ERIE
Syracuse
Utica
Rome
Oswego
Watertown
Ogdensburg
Binghamton
Elmira
Troy
Albany
Schenectady
Saratoga Springs
Glens Falls
Plattsburg
Poughkeepsie
Kingston
Newburgh
Middletown
Hudson
Catskill
Little Falls
Gloversville
Johnstown
Amsterdam
Cohoes
Watervliet
Lansingburg
Ballston Spa
Fort Edward
Whitehall
Granville
Hoosick Falls
Cambridge
Salem
Hoosick
Schaghticoke
Waterford
Green Island
Rensselaer
Stephentown
Chatham
Canaan
Lebanon
Pittsfield
Hillsdale
Copake
Ancram
Millerton
Amenia
Dover Plains
Pawling
Milford
Matamoras
Port Jervis
Goshen
Monroe
Orange
Putnam
Dutchess
Ulster
Sullivan
Delaware
Broome
Tioga
Chenango
Cortland
Onondaga
Cayuga
Seneca
Madison
Oneida
Herkimer
Montgomery
Schoharie
Otsego
Greene
Columbia
Rensselaer
Albany
Schenectady
Saratoga
Fulton
Hamilton
Warren
Washington
Lake Champlain
Lake Ontario
Adirondack Mountains
Catskill Mountains
Lake George
Lake Placid
Saranac Lake
Tupper Lake
Raquette Lake
Blue Mountain Lake
Indian Lake
Long Lake
Newcomb
Northville
Gloversville
Johnstown
Amsterdam
Cohoes
Watervliet
Lansingburg
Troy
Albany
Schenectady
Saratoga Springs
Ballston Spa
Glens Falls
Fort Edward
Whitehall
Granville
Hoosick Falls
Cambridge
Salem
Hoosick
Schaghticoke
Waterford
Green Island
Rensselaer
Stephentown
Chatham
Canaan
Lebanon
Pittsfield
Hillsdale
Copake
Ancram
Millerton
Amenia
Dover Plains
Pawling
Milford
Matamoras
Port Jervis
Goshen
Monroe
Orange
Putnam
Dutchess
Ulster
Sullivan
Delaware
Broome
Tioga
Chenango
Cortland
Onondaga
Cayuga
Seneca
Madison
Oneida
Herkimer
Montgomery
Schoharie
Otsego
Greene
Columbia
Rensselaer
Albany
Schenectady
Saratoga
Fulton
Hamilton
Warren
Washington
Lake Champlain
Lake Ontario
Adirondack Mountains
Catskill Mountains
Lake George
Lake Placid
Saranac Lake
Tupper Lake
Raquette Lake
Blue Mountain Lake
Indian Lake
Long Lake
Newcomb
Northville

Mao U

which divide the State into three sections, one east of the Hudson and south of Lake Champlain, one in the northern part of the State, almost surrounded by water; Lake Champlain and the Hudson on the east, the Mohawk and Oswego rivers on the south and southwest, and Lake Ontario and the Saint Lawrence River on the west and north. The remaining section embraces the central and western parts of the State. The main stream lying wholly within the State is the Hudson River (q.v.), which with its tributaries, the largest being the Mohawk (q.v.), has been a great aid in the development of the commerce of the State. Through the Mohawk Valley the Erie Canal extends, and beyond to the Great Lakes, thus making a continuous waterway from the ocean north to the Mohawk and thence west across the State. The northern part of the State is drained by rivers which flow direct to the Saint Lawrence. The largest are the Black, Oswegatchie, Grasse, Racquette, Saint Regis, and Salmon. The Saranac enters the Saint Lawrence through Lake Champlain, and the Genesee and Oswego through Lake Ontario. The Susquehanna has its head waters in Otsego County, and the source of the Delaware is southeast of Otsego Lake. The Allegheny River, in the western part of the State, enters the Mississippi through the Ohio River. There are a number of falls and picturesque gorges in the Genesee River in the vicinity of the points where the stream breaks through the terraces. In the Adirondack region there are a number of beautiful lakes, the waters of which are remarkably clear. Lake George (q.v.), on the south slope of the mountains, is famous for its scenery and the points of historic interest surrounding it. Lake Champlain (q.v.), on the eastern boundary, together with Lake George, belong to the Saint Lawrence River basin. In the central part of the State are a number of lakes, long and narrow, which are called the Finger Lakes. The largest are Cayuga and Seneca, about 40 miles long, and from two to four miles wide. Oneida (q.v.) Lake is nearly circular in form. Lake Chautauqua, in the western part of the State, 1,212 feet above sea-level, is the highest navigable body of water east of the Rocky Mountains. The waters of this lake enter the Mississippi although it is only nine miles from Lake Erie. The most noted waterfalls and natural curiosities in the State are Niagara Falls, in Niagara River, 2,900 feet wide and 160 feet high; Portage Falls, in Genesee River, consisting of two falls, of 70 feet and 110 feet, and a series of rapids 150 feet; Genesee Falls, in Genesee River, at and below Rochester, consisting of three falls, of 96 feet, 25 feet and 84 feet, within a distance of two and a half miles; Trenton Falls, in West Canada Creek, Herkimer County, consisting of five cascades with a total fall of 200 feet in half a mile; Taughannock Falls, in Tompkins County, 230 feet; Chittenango Falls, in Chittenango Creek, Madison County, 136 feet; Lyons Falls, in Black River, Lewis County, flowing down an inclined plane 63 feet, at an angle of 60°; Kaaterskill Falls, Greene County, consisting of two falls, 175 feet and 85 feet; Baker's Falls, Washington County, consisting of a succession of falls and rapids, having a total descent of 76 feet in 60 rods; Cohoes Falls, in the Mohawk, near its mouth, with a total fall including rapids, of 103 feet; Glens Falls, Warren County, 50 feet; High Falls, in the Hudson, Warren County, 60 feet; High Falls, Ulster County, 50 feet; the Ausable Falls, in Wilmington, Essex County, 100 feet; Enfield Falls, Tompkins County, consisting of a series of cascades with a total fall of 230 feet; Buttermilk Falls, Genesee County, 90 feet; and the falls in Fall Creek, Tompkins County, consisting of five falls with a total descent of over 500 feet in a mile. In East Canada Creek, about two and a half miles from its mouth, is a series of cascades and rapids having a total fall of 75 feet in 80 rods. Upon Stone Bridge Creek, Warren County, is a natural bridge 40 feet high, 80 rods broad, and 247 feet long. Dover Stone Church, Dutchess County, is a ravine 25 feet wide at the bottom, one to three feet wide at the top, about 40 feet long, and 40 to 50 feet high. Near Kyserike, Ulster County, is a cave which has been explored one and one half miles from its entrance. On Black River, at Lyons Falls, are the "Pictured Rocks"; and in Onondaga County are the "Cratean Lakes" and "Green Lakes."

Geology.— Nearly all the geological formations are present in New York. The Archæan is represented in the Adirondacks and the Highlands of the Hudson, by gneisses, granites, ancient crystalline and metamorphic rocks. Potsdam sandstone of a kind which denotes existence in the Cambrian age, is on the northeast and west of the Archæan area of the north. The lower Cambrian rock shows in a narrow strip extending south from the head of Lake Champlain and in the vicinity of Lake George. The palæozoic constitutes four fifths of the State and is represented by schists, slates, metamorphosed rocks in the east and by massive and hard sandstones in the Catskills. The palæozoic is represented by the Cambrian, Silurian, and Devonian periods. The Adirondacks, Highlands and lands west were above sea-level in the Silurian period, but the area of the State west of this uplift remained submerged until the Devonian period. The Triassic and Jurassic are represented by Newark sandstones and shales, in Rockland County; and the Pleistocene, by glacial drift, and lacustrinea and estaurine clays cover a great part of the State. The Pleistocene ice-sheet covered the entire State and accounts for many of the peculiarities of the topography.

Mineralogy.—The Federal census of 1900 gives as the principal mineral productions for the year: salt, 6,791,798 barrels, valued at $2,369,323; gypsum, 58,890 short tons, valued at $929,038; petroleum, 1,320,909 barrels, valued at $1,708,926; fibrous talc, 63,500 short tons, valued at $499,500; metallic paint, 2,500 short tons, valued at $26,900; mortar colors, 2,350 short tons, valued at $25,050; Portland cement, 465,832 barrels, valued at $582,290; rock cement, 3,409,085 barrels, valued at $2,045,451; natural gas, valued at $363,367; limestone, $1,730,161; marble, $332,518; slate, $62,755; sandstone, $1,467,496; granite, $446,171; clay products, $7,660,606; and iron, 441,485 long tons. Coal does not seem to exist in the State although found in large quantities not far south of the boundary. The Catskill and Potsdam sandstone, the Hudson River blue stone, and most of the limestone are valuable for building stone. The greatest deposits of hematite and magnetite are found in the

Adirondack region. Rock salt is found south of Lake Ontario in the vicinity of Warsaw. The mineral springs exceed in value any other State except Wisconsin. The principal mineral and medicinal springs are the salt springs of Onondaga County, from which over 7,000,000 bushels of salt are annually received; Saratoga Springs; New Lebanon and Stockport, Columbia County; Massena, Saint Lawrence County; Richfield, Otsego County; Avon, Livingston County; Clifton, Ontario County; Sharon, Schoharie County; Chittenango, Madison County; and Alabama, Genesee County.

Climate.—The climate of the State, as a whole, is continental; but that of Manhattan Island, Long Island, and Staten Island is modified by the ocean. The average maximum temperature for the State is 100°, and the minimum is a little below zero. The Adirondack region, north of the highest point, or on the northern slope, is the coldest, having the longest and most severe winters. The mean temperature for January is, in the Adirondacks, 15°; on the coast 30°; in the western part 26°. The mean temperature for July, in the Adirondacks, is 64°; on the coast 70°, and in the western part 72°. The rainfall is copious, averaging for the eastern part of the State about 50 inches and for the western part 40 inches. The State is remarkably free from malarial conditions. The Adirondack region is noted for its freedom from conditions inducing tuberculosis.

Flora.— See UNITED STATES.

Fauna.— See UNITED STATES.

Mining and Minerals.— The chief products mined in New York State are salt, iron ore, sandstone, limestone, fire-clay, marble, granite and slate. The salt output of Michigan exceeded that of New York until 1893, since which year New York has ranked first as a salt-producing State. The average annual value from 1898 to 1900 was $2,000,000. The output of iron ore, in 1900, was $1,103,817; for the same year the natural gas brought $363,367; the sandstone $1,467,496; the limestone, $1,730,162; rock cement, $2,045,451; clay products, $8,073,769; the granite averages nearly $400,000, and the marble the same. Gold in small quantities has been found in the Adirondack region, and natural gas near Lake Erie.

Fisheries.— The oyster fisheries are the most productive, representing over half the total value of the fishing industries of the State. Next in value are the menhaden, bluefish, and clams. The most valuable fisheries are on the coast of Long Island; Suffolk County ranks first. The shad and alewives are found in the Hudson; trout in the Adirondack lakes. In 1900 the canned fish amounted to $196,869. The number of persons engaged in the fisheries has diminished from 1880. The State department having charge of the "Forest, Fish, and Game," is pursuing a scientific system, looking to the preservation of the forests, fish, and game of the State.

Agriculture and Stock-raising.— The soil of two thirds of the State is suitable for agriculture, only the rocky mountain area and some sand-belts are considered so unproductive as not to be classed with agricultural lands. All the other conditions for productive farming exist in a favorable degree. Until 1890 New York State ranked first in the value of its agricultural products; in that year some of the Western States reached first place and the farm products of each of three of them were greater that year than those of New York. As the wheat and corn output of the West has increased, the farm products and farm improvements of New York State have decreased. The average of improved land has decreased since 1880, and the nature of the crops raised has varied. The Western wheat and corn in competition has caused the decrease of wheat and corn crops and an increase in the hay acreage. Corn for forage is increasing. The hay forage acreage in 1900 was about half the total crop acreage of the State. The principal farm products of 1900 were: Corn, 17,236,032 bushels, valued at $5,002,048; oats, 44,538,974 bushels, valued at $14,252,472; barley, 3,751,924 bushels, valued at $1,785,932; buckwheat, 3,280,150 bushels, valued at $1,869,690; hay 3,351,991 tons, valued at $47,095,474; potatoes, 27,481,356 bushels, valued at $12,366,610. These figures show that oats is the most important cereal; it is the chief cereal crop of the Saint Lawrence River basin. Next in importance of farm products come potatoes. New York takes first rank in the acreage devoted to potatoes, and in the quality of the crop it is not surpassed. Market gardening is of considerable importance. Nearly all the farm lands of Long Island and in the counties near New York city, on both sides of the Hudson, are devoted to market gardening. In 1850 the average size of farms was 112.1 acres, and in 1900, 99.9. The amount of farm area of the State, in 1900, was 74.3 per cent, of which the amount improved was 68.9 per cent. There were in farms 22,648,109 acres. In 1900 the farms occupied by tenants was 23.9 per cent of the total number. The dairy products of the State are of great importance and great value. The State ranks first in the value of butter and milk, and among the first in the value of cheese. The amount produced is sometimes greater in some of the other States, but the quality in New York is the best and always brings the highest prices. The soil, vegetable, and climatic conditions, and the introduction of scientific methods in dairy farming, have greatly improved the quality of the dairy products. The milk sold in 1900 brought $36,248,833; butter, $9,868,446. The dairy products in 1900 brought 30.5 per cent of the total income from the farms. Along the Hudson, especially in Ulster County, and in the Genesee Valley and west, there are large fruit orchards, apples predominating. In the lake region in the central part of the State grapes flourish. Hops and tobacco are cultivated in the central part, and hops flourish in Franklin County. Floriculture is increasing in counties near the city markets. Fertilizers are used on nearly all farm lands which are productive. The amount used depends upon the nature of the soil and the crop. The farm buildings throughout the State are in a fair condition; the general appearance of the farms indicates thrift and industry.

The table at the top of the succeeding page shows the number and acreage of farms and value of farm property 1 June 1900.

The number of sheep and swine have decreased. Poultry is becoming more prominent, especially where the city and summer resort markets are convenient.

Principal Source of Income	Number of farms	Number of acres in farms			Value of farm property	
		Average	Total	Per cent	Total	Per cent
The State	226,720	99.9	22,648,109	100.0	$1,069,723,895	100.0
Hay and grain	27,095	104.1	2,819,847	12.5	140,739,391	13.2
Vegetables	17,083	59.1	1,009,397	4.5	101,102,441	9.4
Fruits	10,367	52.4	542,792	2.4	51,157,185	4.8
Live stock	38,182	91.3	3,485,805	15.4	145,572,118	13.6
Dairy produce	67,457	120.1	8,706,442	38.4	352,953,954	33.0
Tobacco	1,068	70.6	75,348	0.3	5,186,168	0.5
Sugar	51	135.4	6,907	(*)	279,240	(*)
Flowers and plants	983	7.5	7,362	(*)	8,692,939	0.8
Nursery products	237	74.1	17,568	0.1	3,803,232	0.4
Miscellaneous	64,197	93.1	5,976,641	26.4	260,237,227	24.3

*Less than one tenth of 1 per cent.

Stock holdings were as follows for the years given:

	1890	1900
Dairy cows	1,440,230	1,501,608
Other cattle	691,162	1,094,781
Horses	664,430	628,438
Mules and asses	4,636	3,651
Sheep	1,528,976	984,516
Swine	843,142	676,639

Forests and Lumbering.— The original forests of the Adirondack region were composed chiefly of white pine, hemlock, and spruce; near the base of the northern slope of these mountains there were large forests of maple, birch, elm, white pine, basswood, hemlock, and spruce. The hard and soft woods were also found in the southern and western parts of the State. At one time New York ranked first among the States in lumbering interests. The only forests still standing in which there is much lumbering are in the northern part of the State. Spruce and hemlock now form the principal output for lumber. The pulp wood mills and paper mills are using (1904) large quantities of timber, mostly spruce. This industry increased about 90 per cent during the years 1890–1900. The State owns 1,163,414 acres of Adirondack lands (State Reservation), and there are about 705,914 acres in private parks, and about 1,356,816 acres owned by individuals and companies for their own purposes. During the last decade efforts have been made to preserve the forests of the State. See Forestry.

Manufactures.— New York ranks first among the States in the value of manufactured products. The Erie Canal was a great aid in developing many of the manufacturing industries of the State. It gave an opportunity to bring the raw material at small cost to places where there was water-power, and then, still at low cost, to send the finished products to the markets. The rivers with their extensive water-power have continued to hold the large share of the manufacturing even during the period when steam was the main power in many places, and now the water-power is of greater importance in the development of electrical power. The enormous power of Niagara Falls is causing a remarkable increase in the output of manufactories, especially the aluminum, carborundum, and machinery made at the city of Niagara Falls. The great electrical plants of the State are increasing the manufacturing power; as at Schenectady, Mechanicville and other places on and near the Hudson River (q.v.); also at Massena (q.v.) near the Saint Lawrence River, and in many other parts of the State. According to the Federal census of 1900 there were 78,658 manufacturing establishments, employing $1,651,210,220 capital and 849,056 persons; paying $408,855,652 for wages and $1,143,791,776 for materials; and yielding products having a combined value of $2,175,726,900. The principal articles according to value of output were men's clothing, in factories, $126,478,057; women's clothing, in factories, $106,892,390; foundry and machine shop products, $96,636,517; and sugar and molasses, $90,680,478. The percentage of the population engaged as laborers in manufacturing establishments was, in 1850, 6.4; in 1900, 11.7. In 1900 the value of the manufactures for New York State was one seventh more than that for Pennsylvania. New York's manufacturing establishments were, in 1900, more than one sixth of the total for the United States. About one fifth of the output belongs to the State outside of New York city; three fifths to New York city. Factory-made clothing for men and women is almost all made in New York city. Other cities have special large industries, as the carpet, cotton, and shoe industries at Utica, knitting industry at Yonkers and Cohoes, men's shirts and neckwear at Troy, optical instruments and kodaks at Rochester.

The following table compiled from the Federal census of 1900 gives a comparative summary of 36 leading industries of the State:

COMPARATIVE SUMMARY OF THIRTY-SIX LEADING INDUSTRIES.

Industries	Year	Number of establishments	Capital	Wage-earners		Miscellaneous expenses	Cost of materials used	Value of products, including custom work and repairing
				Average number	Total wages			
Total for selected industries for state	1900	24,417	$1,156,396,994	502,839	$234,922,692	$152,077,272	$759,215,666	$1,380,975,268
	1890	21,309	760,830,178	445,867	211,497,587	86,352,935	583,692,855	1,082,595,478
Increase, 1890 to 1900	..	3,108	395,566,816	56,972	23,425,105	65,724,337	175,522,811	298,379,790
Per cent of increase	....	14.6	52.0	12.8	11.1	76.1	30.1	27.6
Per cent of total of all industries in State	1900	31.0	70.0	59.2	57.5	68.5	66.4	63.5
	1890	32.4	67.3	59.3	57.1	70.8	67.0	63.3
Agricultural implements	1900	87	20,115,962	5,551	2,797,269	833,948	4,824,871	10,537,254
	1890	116	19,924,731	5,620	2,726,538	2,263,680	3,743,157	11,680,842

COMPARATIVE SUMMARY OF THIRTY-SIX LEADING INDUSTRIES — CONTINUED.

Industries	Year	Number of establishments	Capital	Wage-earners: Average number	Wage-earners: Total wages	Miscellaneous expenses	Cost of materials used	Value of products, including custom work and repairing
Boots and shoes, factory product	1900	223	$11,983,239	15,796	$6,138,653	1,251,902	$15,611,386	25,585,631
	1890	257	11,950,891	15,361	6,629,641	812,099	12,383,851	23,661,204
Carriages and wagons	1900	893	14,141,207	6,981	3,899,899	873,942	5,174,662	13,068,385
	1890	1,908	15,363,984	9,776	5,346,529	963,546	6,786,570	16,803,241
Cars and general shop construction and repairs by steam railroad companies	1900	82	11,244,747	13,062	6,762,504	203,221	8,879,813	16,194,850
	1890	46	4,213,639	8,585	4,420,441	.....	4,527,381	9,046,025
Cheese, butter, and condensed milk, factory product	1900	1,908	7,084,130	2,439	1,157,081	337,303	22,486,869	26,557,888
	1890	1,308	4,002,026	2,461	640,827	149,946	12,362,992	14,385,966
Chemical products: Total	1900	279	46,459,948	8,854	4,638,859	2,980,719	24,554,418	40,663,363
	1890	288	34,813,828	8,720	4,372,019	3,637,132	24,581,078	41,338,134
Chemicals (acids, bases, and salts)	1900	92	22,105,837	4,531	2,302,999	1,142,851	8,669,561	15,994,366
	1890	133	16,075,305	5,266	2,548,278	2,007,320	11,781,828	20,646,278
Dye stuffs and extracts	1900	19	2,548,136	538	300,832	128,447	1,263,843	2,111,811
	1890	15	2,752,195	497	266,288	69,645	1,381,906	2,019,615
Fertilizers	1900	32	4,600,559	1,033	491,898	317,826	1,909,158	3,147,894
	1890	31	3,895,779	690	325,006	217,514	2,138,915	3,498,291
Oil, essential	1900	14	256,885	42	24,295	38,411	412,832	531,000
	1890	7	54,930	28	9,430	31,898	91,980	159,163
Paints	1900	82	11,318,449	2,173	1,175,277	815,946	8,344,936	12,543,825
	1890	70	7,534,668	1,810	937,502	767,808	6,395,947	9,801,124
Varnish	1900	40	5,630,082	537	343,558	537,238	3,954,088	6,334,467
	1890	32	4,500,951	429	285,515	542,947	2,790,502	5,213,663
Clothing—Total	1900	4,204	80,633,853	90,017	41,567,834	28,803,498	121,348,345	233,379,447
	1890	3,466	57,534,954	78,874	34,922,393	9,163,467	67,961,888	141,968,351
Clothing, men's, factory product	1900	2,531	51,350,648	41,300	19,579,938	6,937,994	64,500,271	126,478,057
	1890	2,661	46,153,319	54,110	24,100,196	20,396,003	45,898,538	96,880,957
Clothing, women's, factory product	1900	1,673	29,283,205	48,717	£1,987,896	8,407,495	56,848,074	106,892,390
	1890	805	11,381,635	24,764	10,822,197	2,225,473	22,063,350	45,087,394
Coffee and spice, roasting and grinding	1900	87	9,405,886	1,541	711,404	1,523,357	18,130,868	22,470,856
	1890	70	4,882,987	1,260	640,981	326,986	28,338,042	31,013,213
Confectionery	1900	858	8,330,656	7,230	2,674,077	1,753,214	10,683,276	18,842,148
	1890	657	5,678,878	5,920	2,184,685	782,798	6,971,074	12,920,812
Electrical apparatus and supplies	1900	134	17,697,352	10,370	5,666,702	893,038	12,538,790	22,695,024
	1890	66	8,976,892	3,890	2,091,860	420,468	4,125,504	8,189,180
Flouring and grist mill products	1900	1,513	23,384,858	2,489	1,284,438	1,014,018	36,523,959	42,796,340
	1890	1,235	21,128,597	3,389	1,599,168	1,410,681	44,890,115	52,550,744
Foundry and machine shop products	1900	1,352	107,926,155	50,173	27,576,739	7,390,514	41,814,790	96,636,517
	1890	1,081	68,086,728	39,133	23,245,546	4,637,952	27,273,952	72,084,500
Fur goods	1900	560	7,299,989	4,454	2,486,071	1,208,935	8,732,323	15,828,996
	1890	281	5,620,290	4,342	2,322,314	452,392	6,897,292	12,434,272
Furnishing goods, men's	1900	270	16,158,628	21,610	7,299,054	1,963,863	15,863,729	31,000,834
	1890	215	5,284,529	11,671	3,349,872	1,360,611	6,788,652	14,379,970
Furniture, factory product	1900	354	16,436,743	14,481	6,983,087	1,813,548	9,908,514	23,643,245
	1890	415	13,417,296	13,211	7,605,418	1,322,226	9,504,797	23,539,011
Gas, illuminating and heating	1900	101	171,379,067	5,381	3,676,712	5,060,906	5,866,549	20,917,726
	1890	94	77,899,876	3,970	3,062,641	2,521,614	4,944,042	18,716,683
Gloves and mittens	1900	244	6,219,227	9,889	2,716,223	341,567	6,317,033	10,835,898
	1890	212	4,143,502	6,208	1,998,737	253,785	3,724,094	7,369,730
Iron and steel	1900	30	12,183,866	5,418	3,062,711	503,558	7,676,155	13,858,553
	1890	44	15,982,435	6,848	3,303,811	877,541	10,424,852	15,849,537
Ironwork, architectural and ornamental	1900	203	6,167,239	4,942	2,936,838	835,632	6,877,269	12,745,249
	1890	155	3,739,291	4,018	2,591,595	322,298	4,147,313	8,386,281
Jewelry	1900	250	5,828,008	3,022	2,001,816	474,446	5,427,002	10,244,624
	1890	195	3,461,294	1,994	1,380,241	246,216	3,489,132	7,385,139
Leather, tanned, curried, and finished	1900	147	19,062,817	6,530	2,775,115	558,470	17,424,300	23,205,991
	1890	210	14,553,591	6,200	2,914,165	802,564	16,328,321	23,348,078
Liquors—Total	1900	279	97,610,103	7,730	5,741,081	27,996,873	11,942,896	58,282,253
	1890	249	68,219,486	7,084	5,562,402	16,730,168	18,966,530	54,009,249
Liquors, distilled	1900	16	394,906	62	26,621	909,958	141,626	1,201,851
	1890	6	195,793	48	22,073	261,257	118,750	422,824
Liquors, malt	1900	225	95,057,875	7,424	5,630,996	26,954,024	11,418,383	56,137,854
	1890	232	67,759,552	7,001	5,525,189	16,445,206	18,776,129	53,429,685
Liquors, vinous	1900	38	2,157,322	244	83,464	132,891	382,887	942,548
	1890	11	264,141	35	15,140	23,705	71,651	156,740
Lithographing and engraving	1900	111	12,288,055	6,335	3,497,757	1,543,750	3,790,350	11,062,856
	1890	94	6,675,542	4,094	2,799,634	462,130	3,012,751	8,333,764
Lumber—Total	1900	2,274	44,814,743	18,365	8,320,604	1,721,394	27,545,491	45,523,234
	1890	2,274	45,509,401	27,160	11,180,221	2,371,739	28,561,204	50,925,720
Lumber and timber products	1900	1,765	21,873,203	6,850	2,737,361	523,407	9,038,425	15,766,977
	1890	1,734	21,430,739	12,981	3,369,484	1,028,246	8,865,653	17,160,547
Lumber, planing mill products, including sash, doors, and blinds	1900	509	22,941,540	11,515	5,583,243	1,197,987	18,507,066	29,756,257
	1890	540	24,078,662	14,179	7,810,737	1,343,493	19,695,551	33,765,173
Millinery and lace goods	1900	393	7,720,991	11,274	4,031,573	1,139,237	11,177,259	21,037,782
	1890	165	3,845,161	6,038	2,754,089	513,469	4,671,761	10,803,361
Musical instruments: Total	1900	193	14,313,495	7,244	4,200,754	1,104,288	6,868,284	15,509,839
	1890	211	11,091,456	7,142	5,025,059	685,269	6,160,196	15,713,919
Musical instruments and materials, not specified	1900	58	1,146,213	443	237,495	52,116	305,749	763,408
	1890	81	277,821	309	163,143	38,845	196,802	588,834
Musical instruments, organs and materials	1900	17	269,336	151	101,900	17,858	119,339	326,517
	1890	23	549,473	321	220,887	27,212	257,201	670,017

COMPARATIVE SUMMARY OF THIRTY-SIX LEADING INDUSTRIES — CONTINUED.

Industries	Year	Number of establishments	Capital	Wage-earners		Miscellaneous expenses	Cost of materials used	Value of products, including custom work and repairing
				Average number	Total wages			
Musical instruments, pianos and materials	1900	118	$12,897,946	6,650	$3,861,359	1,124,314	$6,443,196	14,419,914
	1890	107	10,264,162	6,512	4,641,029	619,212	5,706,193	14,455,068
Paper and wood pulp	1900	179	37,349,390	9,268	4,099,771	2,398,994	14,563,222	26,715,628
	1890	153	17,124,359	5,339	2,234,747	1,417,066	8,061,038	14,192,240
Patent medicines and compounds	1900	392	12,809,437	2,885	1,182,657	5,845,921	4,914,438	17,075,937
	1890	227	4,565,538	1,467	615,669	2,003,686	2,202,079	8,032,938
Petroleum, refining	1900	4	16,970,492	2,629	1,306,084	974,321	23,435,357	27,184,524
	1890	9	24,166,205	3,096	1,626,065	576,161	20,979,247	25,786,841
Printing and publishing—Total	1900	2,640	80,588,361	32,948	20,309,991	20,345,531	23,364,449	95,232,051
	1890	2,230	47,569,089	27,587	19,009,061	13,746,517	16,398,183	68,929,001
Book and job	1900	1,412	24,114,794	16,273	9,265,500	4,915,318	8,691,912	31,413,113
	1890	953	17,541,631	13,175	7,876,656	2,413,066	6,692,084	24,191,080
Music	1900	22	987,093	215	119,736	251,297	160,647	853,862
	1890	14	311,430	134	69,298	52,448	55,949	344,850
Newspapers and periodicals	1900	1,206	55,486,474	16,460	10,924,755	15,178,916	14,511,890	62,965,076
	1890	1,263	29,716,028	14,278	11,063,107	11,281,003	9,650,150	44,393,071
Shirts	1900	324	9,526,124	13,565	4,699,177	3,313,052	10,721,902	22,782,302
	1890	377	7,794,695	17,948	5,193,886	1,243,222	7,349,370	17,483,958
Slaughtering—Total	1900	110	15,357,075	3,099	1,846,434	1,274,534	50,523,186	57,431,293
	1890	181	12,605,460	3,744	2,434,142	960,083	67,560,780	76,642,151
Slaughtering and meat packing, wholesale	1900	53	7,309,162	1,530	777,738	520,208	16,980,708	19,624,187
	1890	76	6,740,912	1,922	1,123,539	460,478	29,832,621	34,848,582
Slaughtering, wholesale, not including meat packing	1900	57	8,047,913	1,569	1,068,696	754,326	33,542,478	37,807,106
	1890	105	5,864,548	1,822	1,310,603	499,605	37,728,159	41,793,569
Soap and candles	1900	91	7,669,979	2,020	821,340	2,020,165	7,853,624	12,833,645
	1890	101	4,654,025	1,711	812,809	846,599	5,295,768	9,036,082
Sugar and molasses, refining	1900	14	64,020,999	3,275	1,877,320	2,300,545	86,148,971	90,680,478
	1890	14	3,877,973	610	274,701	246,957	15,272,692	17,157,694
Textiles—Total	1900	537	93,722,819	64,901	22,672,339	6,701,209	50,584,295	94,263,047
	1890	627	76,364,192	61,097	20,894,583	4,852,224	47,964,507	86,642,771
Carpets and rugs, other than rag	1900	12	12,870,200	8,603	3,308,438	541,841	7,681,097	15,029,218
	1890	15	11,178,342	8,879	3,218,367	399,322	8,689,413	14,606,116
Cotton goods (including cotton small wares)	1900	52	15,060,149	9,259	2,745,848	943,848	5,718,295	10,788,003
	1890	42	13,290,745	8,316	2,448,031	724,405	5,564,251	9,777,295
Dyeing and finishing textiles	1900	42	6,230,657	3,117	1,424,578	210,395	1,402,373	3,625,882
	1890	49	4,963,095	2,725	1,344,250	367,935	1,454,119	3,636,051
Felt goods	1900	11	2,183,050	735	297,853	114,900	987,380	1,734,136
	1890	11	1,371,219	773	301,933	86,273	807,276	1,517,199
Hosiery and knit goods	1900	242	30,203,640	26,470	8,964,097	2,199,029	20,218,200	35,886,046
	1890	201	19,608,331	19,828	5,925,569	1,389,427	13,669,169	24,776,582
Shoddy	1900	9	329,861	167	65,739	18,122	310,783	443,529
	1890	12	482,520	173	60,061	11,640	343,012	471,478
Silk and silk goods	1900	92	9,800,207	7,861	2,861,818	1,601,527	6,570,037	12,706,246
	1890	185	11,165,918	12,719	4,983,063	1,123,671	10,174,818	19,417,796
Wool hats	1900	5	896,852	930	403,213	68,296	789,348	1,376,721
	1890	5	1,444,767	976	323,620	54,233	860,937	1,489,132
Woolen goods	1900	65	7,338,813	4,033	1,399,527	761,841	3,499,864	6,715,005
	1890	91	7,243,380	2,838	946,711	353,245	2,930,932	5,188,020
Worsted goods	1900	7	8,809,390	3,726	1,201,228	241,410	3,406,918	5,958,259
	1890	16	5,615,875	3,870	1,342,978	342,073	3,470,580	5,763,102
Tobacco—Total	1900	3,097	22,491,354	27,071	11,502,724	12,687,859	19,115,021	53,660,580
	1890	2,888	26,107,357	30,299	13,731,097	6,969,643	21,042,650	51,853,976
Chewing, smoking, and snuff	1900	42	1,757,687	1,020	345,704	2,032,836	1,734,072	4,632,101
	1890	30	2,671,274	1,531	574,009	1,006,457	1,610,642	4,431,373
Cigars and cigarettes	1900	3,055	20,733,667	26,051	11,157,020	10,655,023	17,380,940	49,028,479
	1890	2,858	23,436,083	28,768	13,157,088	5,963,186	19,432,008	47,422,603

Transportation and Commerce.— The principal railroad systems crossing the State are the New York Central & Hudson River, the West Shore (New York, Chicago & Saint Louis), the Erie, the Lehigh Valley, the New York, Ontario & Western, the Delaware, Lackawanna & Western, the Pennsylvania, and the Delaware & Hudson. The great trunk lines of the country make connections with all these roads. In 1900 there were 8,095 miles of railroad in the State. In the year 1899 the railroads of the State had one fourth of all the passenger carrying trade and one fifth of all the freight traffic of the United States. The Mohawk and Hudson was the first railroad in the State; it was completed and ready for operation in 1831, extended from Albany to Schenectady and was 17 miles long. About 11 years afterwards there was a railroad completed from Albany to Buffalo; next came the Erie, and then the road from New York city to Albany. In 1825 the Erie Canal (q.v.) was opened, and it has been in use in the carrying trade since that time. Other canals of the State are the Oswego, the Champlain and several branches. At the general election, in November 1903, the people voted an appropriation of $101,000,000 to enlarge the Erie Canal. The State board of railroad commissioners have general supervision of railroads, especially with reference to public safety and convenience and to any violations of the law governing the railroads of New York. The total construction and equipment of all railroads, steam, surface, and elevated, within the State, is as follows: 1850, $63,255,847.83; 1860, $137,848,323.59;

1870, $308,890,198.76; 1880, $716,101,467.28; 1890, $1,385,560,174.65; 1900, $1,732,960,017.48. New York ranks first in the Union in foreign commerce. At present large numbers of Chinese coming to the country are held at Malone for trial as to their rights to enter. In the year 1900 there passed through the port of New York 35.60 per cent of the exports of the United States, and 64 per cent of the imports. The commerce between the places in New York State and other points in the Union is much greater than the foreign trade of the State.

Banks.— In 1782 the first bank in the State was incorporated as the Capital Bank of North America. The second bank was chartered in 1791, as the Bank of New York. The privilege to establish a bank or the granting of a bank charter became a political favor after 1804, when the law was passed making it necessary to have the sanction of the Legislature to establish a bank or issue currency. In 1812 there were 20 banks in the State, and in 1829, 48 banks. The charters were for a specified term of years, and various means were resorted to to secure renewals. It was deemed necessary to change the laws for the establishment and government of banks, and in 1829–30 a change was effected. The "safety fund" method was established. A board of bank commissioners was created, examinations and annual reports were established. (See BANKS.) The system of clearing houses now deemed essential, began in New York city. In 1854, the first year of trial for the new system, the exchange amounted to $5,500,000,000. The total exchanges in 1900 were over $60,000,000,000. The conditions which govern commerce and finance make the clearing house of New York, practically, the clearing house of the United States.

The following statistics give valuable information regarding the growth of the banking system of the State:

BANKS, BANKING ASSOCIATIONS, AND INDIVIDUAL BANKERS.

	1834	1840	1850	1860	1870	1880	1890	1900
Number	69	95	244	306	59	68	164	211
Capital	$22,730,264.00	$36,401,460	$55,580,181	111,834,347	$19,759,810	$18,738,200	$29,539,825	$28,810,700
Resources	64,782,853.25	86,987,548	.....	311,245,555	79,281,601	99,850,755	254,068,296	351,080,252
Bank-note circulation	15,402,705.54	15,235,056	27,511,787	31,759,127	439,303	37,553	8,064	.....
Profits	3,005,560.77	4,985,596	9,232,473	13,316,468	7,384,299	8,058,180	21,146,448	28,308,438
Deposits	8,402,739.36	16,796,218	54,467,682	116,190,466	46,447,905	61,795,773	177,109,131	238,194,498

Note.— Dec. 15, 1850. The 73 incorporated banks report capital, $27,664,860; circulation, $20,669,178.50. For years 1834 and 1840, banks reporting, both Safety Fund and not Safety Fund, to the commissioners were used.

SAVINGS BANKS.

	1860	1870	1880	1890	1900
Number	71	136	128	124	128
Resources	$70,409,752.00	$245,091,177.00	$400,944,380.00	$667,865,396.40	$1,037,869,160.34
Deposits	67,440,397.00	230,749,408.00	353,629,657.00	574,669,972.59	922,081,596.26
No. of accounts open	300,693.00	712,109.00	953,707.00	1,477,819.00	2,036,016.00
Average account.	224.28	324.03	370.79	388.86	452.88

SAFE DEPOSIT COMPANIES.

	1890	1900
Resources	$3,964,942.79	$5,297,905.54

TRUST AND MORTGAGE COMPANIES.

			1880	1890	1900
Number	.....	.....	12	32	59
Assets or Resources	.....	.....	$104,797,575.41	$280,688,768.47	$796,483,887.12
Deposits	.....	.....	*96,304,510.62	211,320,275.05	640,837,146.35
Surplus	.....	.....	8,493,064.79	25,800,304.84	74,506,401.87

* Includes other liabilities.

NATIONAL BANKS IN NEW YORK STATE.

	1865	1870	1880	1890	1900
Number	308	293	319	295	337
Capital	$114,992,950.00	$112,497,741.00	$85,736,060.00	$85,287,160.00	$97,322,340.00
Circulation	42,914,762.00	63,229,183.00	16,818,677.00	46,504,807.00	51,355,465.00
Individual Deposits	232,932,534.99	217,634,371.37	340,204,504.45	406,440,215.38	617,656,663.39
Resources	509,182,649.24	523,245,031.87	693,426,072.82	720,213,916.79	1,322,249,445.22

Finance.— The State income is derived mainly from a tax for general expenses and for schools, 29 per cent; corporation tax, 25.5 per cent; excise tax, 17.5; and inheritance tax, 14 per cent. The first arrangement made for an income for State expenditures was the formation of a productive fund from the sale of public land. For a time the income derived from this general fund was sufficient for the support for the State government and the schools. In 1814 it was found necessary to increase the revenue, and this was done by forming another productive fund for school purposes. Later a direct tax was levied, but in 1826 this was discontinued. A system of public improvements was instituted in 1817, and a public debt of $7,000,000 was incurred. The Erie Canal and other public improvements increased the debt. An effort was made to meet the new obligations by a sinking fund and by canal tolls and other means. The plan of loaning State credit to private corporations, principally railroads, was begun in 1827. In 1842 the Erie Railroad failed with a large indebtedness to the State. Other smaller creditors failed also, and this new debt, together with that of the former, amounted to $20,310,000. A tax was imposed sufficient to meet expenses, many public improvements were stopped, and outside debts were funded. The Constitution adopted in 1846 inserted clauses looking to a prevention of such conditions. No debt could be contracted except for war, and then popular sanction by a referendum was necessary. A general sinking fund and a canal sinking fund were created. The Constitution now in force (1904) retains the provision relative to popular sanction by a referendum. In the year 1865 the State debt was the greatest it has ever been, $53,000,000. Of this amount $30,000,000 was war bounty debt. In five years the debt was reduced to $32,400,000; another decade saw it only $8,988,000; and the whole debt was canceled in 1893. In 1900 a new debt was created for improvement of the Erie Canal. On 1 Jan. 1903 the total State debt was $10,000,000. The income at present is derived from taxes on assessable property, fees from foreign corporations, licenses, taxes on certain public franchises, trusts, and banks. For the year 1903 the expenditures were $23,601,955; the balance in the treasury was $6,992,599.

Government.— The government of the State is administered in accordance with the provision of the State Constitution. This Constitution may be amended by a majority vote of the House in two consecutive Legislatures and adopted by popular vote of the people. It may be revised by a Constitutional Convention, and the popular vote of the people. The last revision of the State Constitution was made in 1894, and went into effect 1 Jan. 1895. This Constitution provides for amendments and revisions as stated, and that the question of a Constitutional Convention and of a revision of the Constitution must be submitted to the general vote of the people every 20 years, or more frequently if so ordered by the Legislature. It provides also for a State census every 10 years. All male citizens in New York State can vote, unless debarred by crimes against the law or of unsound mind. To be a citizen of New York State a man must have been a citizen 90 days, one year a resident of the State, four months a resident of the county, and 30 days a resident of the town or precinct. It is also required that voters to be entitled to vote must register, but registration for town and village elections cannot be made obligatory unless by express provision of law. In the cities the holding of party primaries are regulated by law; and the way in which votes shall be cast in all parts of the State is also regulated by law. The officers of the government are the executive, the members of the Legislature, the judiciary, and their subordinates.

Executive.— The governor of New York is elected biennially, by popular vote at a general election held throughout the State the first Tuesday after the first Monday in November. He appoints a superintendent of public works, a superintendent of banking, of insurance, of State prisons, a factory inspector, a commissioner of agriculture, commissioner of labor, statistics, and an excise commissioner. He has a veto right which may be used to prevent appropriations or other legislative measures; but the Legislature may overrule the veto of the governor by a two-thirds vote of the members of the Senate and Assembly. He may pardon or reprieve criminals, and he may commute a sentence. He has power to make appointments other than those mentioned subject to approval by the Senate. The officials elected with the governor and for the same number of years are the lieutenant-governor, secretary of state, comptroller, treasurer, attorney-general, and state engineer and surveyor. The most important State boards or commissions are for health, lunacy, and charities, for forestry, railroads, quarantine, and tax equalization.

Legislature.— The Legislature is composed of a Senate of 50 members, who hold office two years; and an Assembly of 150 members, who hold office one year. The State is divided into senatorial and assembly districts. The senatorial districts, being less in number, have each a much greater population than each of the assembly districts. The lieutenant-governor is president of the Senate. The members of the Assembly elect their own presiding officer, who is called the Speaker. The populous counties are divided into two or more assembly districts. The members of the Legislature receive a salary of $1,500 and mileage for each session. The Legislature holds its sessions in the State Capitol at Albany.

Judiciary.— The court of appeals is the highest court in the State. It consists of the chief justice and six associate justices, each chosen by a popular vote and for a term of 14 years. There are 76 judges belonging to the supreme court, each one of which is chosen by popular vote for 14 years. The State is divided into eight judicial districts. Other courts provided for by law are county courts, city courts, surrogate's courts, justice's courts.

Local Government.— The incorporation of villages, chartering cities, and organization of counties is within the jurisdiction of the Legislature. The Legislature decides the limit of taxation and assessment for incorporated villages and cities, and restricts their power of borrowing money. Any special legislation for a city or the cities of the State shall be submitted to the cities concerned, for their approval or rejection; but the Legislature may later over-

rule the veto of the city. Cities are divided, according to population, into three classes. The first class includes cities having a population of 250,000 or more; the second class includes cities having a population of over 50,000 and less than 250,000; the third class includes all other cities in the State. The cities are classified as follows: First class — New York, Buffalo; second class — Albany, Rochester, Syracuse, Troy; third class — Amsterdam, Auburn, Binghamton, Cohoes, Corning, Cortland, Dunkirk, Elmira, Geneva, Gloversville, Hornellsville, Hudson, Ithaca, Jamestown, Johnstown, Kingston, Little Falls, Lockport, Middletown, Mount Vernon, Newburgh, New Rochelle, Niagara Falls, North Tonawanda, Ogdensburg, Olean, Oneida, Oswego, Poughkeepsie, Plattsburgh, Rensselaer, Rome, Schenectady, Utica, Watertown, Watervliet, Yonkers.

Militia.—The National Guard, a portion of the State militia, is armed, equipped, and ready for service at all times. It numbers 14,410, which includes officers and enlisted men. The Naval militia is also a part of the State militia, and it also is ready for service at any time. It numbers 651 officers and enlisted men. There are four brigades of the National Guard. The headquarters are in Albany.

Political Divisions.—The State is divided into 61 counties. The county officers are judge, surrogate, sheriff, clerk, treasurer, district attorney, superintendent of the poor, and coroners. Each county, except New York, is divided into towns. The officers of the town are supervisor, clerk, commissioner of highways, assessors, constables. There are 42 cities (1904), the largest of which are: New York, pop. (1900) 3,437,202; Buffalo, 352,387; Rochester, 162,608; Syracuse, 108,374; Albany, 94,151; Troy, 60,651; Utica, 56,383. The other cities were, as reported by the Federal census of 1900, less than 50,000. The government of the cities is vested in a mayor, board of aldermen, and the subordinate officials. Some cities are governed under a special charter. The villages are usually smaller than the cities, and the government is administered by a president and a board of village trustees. There are 37 congressional districts; the State sends 37 Representatives to Congress. There is a State Park or Reservation in the Adirondack Mountains, and one at Niagara Falls. There is a State Reservation for Indians on the Saint Lawrence River at the mouths of the Saint Regis and the Racquette rivers.

Religion.— All Christian denominations, and the Jews, have churches and large congregations throughout the State. Among Christian Churches, the Roman Catholic predominates in number of communicants and church attendance, in the cities, and Protestants in the smaller cities and country places. The Protestant denominations, according to number of communicants and attendance, rank as follows: Methodists, Presbyterians, Baptists, Protestant Episcopalians, Lutherans, and Congregationalists.

Education.— The system of education aims to furnish free schools for all the minors of the State, and in late years a system of education for adults has been organized and put into force with success. For many years the Regents of the University (q.v.) had the supervision of the secondary schools, colleges, and universities, aided, supported, or incorporated by the State, and the elementary schools, normal and training schools, teachers' institutes, training classes, and Indian schools were in charge of the State Department of Public Instruction. The Legislature (February 1904) has under consideration a plan to unify the two departments of State school supervision. Children between the ages of 8 and 16 years are compelled to attend school (public or private). The school census of 1901 gave as the number of persons of school age (from 5 to 18 years), 1,620,287. Of this number 1,242,416 were enrolled in the public schools; 200,000 in the parish schools (not private schools), leaving 277,871 not accounted for by the public and parish school records. Of this number not so enrolled, a large per cent were in attendance at private schools, and a number over 16 and under 18 may not have been attending school. In the advanced secondary schools, the colleges, universities and seminaries of the State there is a large attendance of pupils over 18 years of age. The compulsory law is so wisely and rigidly enforced that it is safe to say that all the children of the ages reached by the compulsory law are being educated in some school, unless prevented by mental or physical disorders. The illiterate population of the State (1901), 10 years of age and over, was 5.5 per cent of the whole population. This per cent is about 1.1 for native white, or less. The school revenue for 1901 was from the permanent school fund. $272,477; from State taxes, $3,500,000; from local taxes, $26,451,363; from other sources, $8,245,437, making a total of $38,469,277. The cost per pupil was $41.68. There were, in 1901, 383 public high schools, with an enrolment of 63,549 pupils; and 199 private high schools and academies, with an enrolment of 11,650 pupils.

Training for teachers is given in 11 State normal and training schools, one State normal college, and a large number of training classes located in different villages and cities, according to the needs of the sections asking for the establishment of such schools. Teachers' institutes are provided by the State, and a regular teaching institute staff is maintained. (See SCHOOLS, NORMAL AND TRAINING.) The system of granting certificates or of licensing teachers is by uniform examinations. The Examination Department makes out the questions, assigns the time (for State examinations, the place), examines all the papers of the candidates, and decides who shall or shall not receive certificates. Many of the cities have special rules regarding other examinations, and also the establishment and maintenance of city training schools and classes. The local supervisor in a city is the superintendent of schools, in an assembly district, the school commissioner. The country sections are divided into school districts.

Cornell University (q.v.) is the only institution of collegiate grade in the State which awards scholarships by examinations. Columbia University (q.v.), founded under the auspices of the Protestant Episcopal Church, is the oldest institution of the kind in the State. Other colleges and universities are: New York University, New York city; College of the City of New York; Union College at Schenectady; Hamilton College, Clinton; Hobart College, Geneva; Colgate University, Hamilton; Saint John's, Saint

Francis Xavier, Manhattan, and De la Salle colleges, New York city; colleges and universities in Buffalo, Syracuse, and Rochester. Vassar College (q.v.) is at Poughkeepsie, Barnard is affiliated with Columbia. There are 17 theological seminaries, 12 medical schools, 4 schools of pharmacy, 3 dental schools, 7 law schools. The State requires a certain degree of education before beginning the study of a profession, in a State school, and an examination is given at the end of the course to determine fitness and ability for graduation. The New York State Library (q.v.) claims to be the first public library in the State; it was founded in 1700. (See LIBRARIES; REGENTS, for "Traveling Libraries" and "Home Study Clubs.") The following statistics show the growth of the educational movement in the State:

	Cost of maintenance of schools	Amount expended for teachers' wages	Amount expended for school houses, sites, furniture, and repairs	Amount expended for libraries
1850	$ 1,607,684.85	$ 2,025,367		
1853				
1857			$ 746,092	$ 49,499
1860	3,744,236.95	2,597,964	642,291	34,036
1870	9,905,514.22	6,496,692	1,970,579	30,652
1880	10,296,977.26	7,638,922	1,145,831	30,399
1890	17,392,471.61	10,422,171	4,593,264	49,889
1900	33,421,491.37	19,218,893	8,548,643	142,158

Charitable Institutions.— The governor and the Senate appoint the State boards of charities, corrections, and lunacy. The duties of the Board of Charities are to exercise an advisory supervision over charitable institutions, State and local, and over private institutions to which public charges have been committed. The institutions thus supervised (1902) are about 510, and the number of inmates in these institutions is about 60,000. The office of fiscal supervisor of State charities was created by ch. 252, Laws of 1902. He is appointed by the governor subject to confirmation by the Senate, and has the general supervision over the accounts and expenditures of the charitable and correctional institutions of the State, which include reformatories, industrial schools, institutions for the mentally defective, institutions for soldiers, for the blind, orphans, crippled, deformed, and treatment of tuberculosis. State charity institution buildings are contracted for under the supervision or by the approval of the governor, president of the State Board of Charities and the state comptroller. The present (1904) State institutions are houses of refuge for women at Albion and Hudson, reformatory for women at Bedford, soldiers' and sailors' home at Bath, Craig colony for epileptics at Sonyea, home for feeble-minded women at Newark, home for orphan Indian children at Iroquois, industrial school, Rochester, home for feeble-minded children, Syracuse, home for soldiers' orphans at Oxford, hospital for crippled and deformed children at Tarrytown, school for the blind at Batavia, hospital for cases of incipient pulmonary diseases at Raybrook. There are schools for the deaf and dumb, and several private institutions which receive State aid, but are not wholly supported by the State. There were supported in county almshouses, during the year ending 1 Oct. 1900, 15,780 persons. In city and town almshouses fully 70,000 were supported. During the same time about 210,000 received temporary relief. The State expenditures for the institutions supervised by the Board of Charities for the year ending 30 Sept. 1900 were $16,107,000.

The Board of Lunacy has supervision of the State insane hospitals. They are located at Binghamton, Buffalo, Dannemora, Flatbush, Gowanda, Kings Park, Matteawan, Middletown, Ogdensburg, Poughkeepsie, Rochester, Utica, Wards Island (New York city), Willard, Ovid. There were, in 1900, 23,267 patients in these institutions, and the number is now (1904) considerably increased. There are also 20 private institutions authorized by the State board to receive insane patients. The private institutions, partially under State supervision, had, in 1900, nearly 1,000 inmates. The cost for maintenance and operation of the State insane asylums for the year 1900 was $3,594,873.

Penal Institutions.— The State prisons are located at Ossining (Sing Sing), Auburn, Clinton (Dannemora). The State reformatories are at Elmira and Napanoch; one for women at Bedford. Houses of refuge are at Albion and Hudson. The State penitentiaries (county institutions for short term convicts) are in the counties of Albany, Clinton, Erie, Kings, Monroe, and New York. The counties which do not have penitentiaries arrange with the penitentiary of some other county for care and support of those sentenced to such a place of detention and punishment. The number of persons in prisons and jails of the whole State, in the year 1898, was 149,677; in 1902, 96,932. The abolition of the fee system in many of the counties, the more general application of the law of suspended sentence, the efforts to induce prisoners to reform, all have contributed to the decrease in the number of prison inmates. The system of instruction and training employed at Elmira is resulting in practical reforms. The parole law and the indeterminate sentence are being introduced into many other prisons. Capital punishment is still in force in the State; death by electricity, since 1880, has been substituted for hanging. Murder in the first degree is the only crime for which capital punishment is inflicted.

Population.— Since 1820 the State has held first rank in population. The State receives (and a large number remain) the majority of the emigrants. The number of the foreign born, resident of the State in 1900, was 1,900,425, or nearly double the number in any other State. The population born in the State, but of foreign parents, was 2,415,845. There were the same year, 5,257 Indians, 7,170 Chinese, and 99,232 negroes. The urban population has increased more than the country. In the decade from 1890 to 1900, the rate of increase for the State was 21.2 per cent; the rate for the same year for the whole United States was 20.7 per cent. Pop. (1800) 589,051; (1810) 959,049; (1820) 1,372,111; (1830) 1,918,608; (1840) 2,428,921; (1850) 3,097,394; (1860) 3,880,735; (1870) 4,382,759; (1880) 5,082,871; (1890) 5,997,853; (1900) 7,268,012.

History.— As the credit for the discovery of America belongs to one Italian, Christopher Columbus, the protégé of the far-seeing Queen Isabella of Spain, the credit for the discovery of New York is linked with the name of another

Italian, Giovanni da Verrazano, the Florentine, in the service of Francis I. of France. Verrazano's ship, La Dauphine, which left Dieppe with several others in the autumn of 1523, unquestionably sailed by Sandy Hook in the middle of April 1524; proceeded as far as Raritan Bay, when by stress of weather Verrazano was forced to return to the open sea and continue his journey to the eastward. While Spain's discovery of the Continent antedated the French discovery of New York by forty-two years, the French navigators anticipated the Dutch on the same lines by eighty-five years. The English who were the last to arrive had no part in discovering any of the land which is now known as New York, although eventually they controlled the entire territory from Florida northward.

French enterprise early determined the importance commercially and politically of the New World, although handicapped by the fierce civil wars that raged from 1560 until the accession of Henry IV. in 1594. The year made memorable by the Edict of Nantes, 1598, which secured freedom of worship for the Protestants, the Marquis de la Roche obtained a commission to conquer Canada. His expedition was a lamentable failure. Five years later De Monts, who had been commissioned governor of Acadia, brought a number of colonists to Port Royal, subsequently called Annapolis by the English, but after two years of hardships the settlement was abandoned, the pioneers returning to France. De Monts' commission, which had been revoked, was revived by a company of French merchants who entrusted their fortunes to Samuel de Champlain, a man who by education, ability and perseverance was thoroughly competent to execute the responsible trust committed to him. What William Penn was to the English court, that was Champlain to the French king, Henry of Navarre. He was a soldier and sailor of fortune; a sincere and devoted Christian. To him must be accorded the imperishable honor of being the first man who set his foot in New York, as he was the first to teach religion to the Iroquois. In 1608 he founded the city of Quebec. The twelve years' truce which acknowledged the sovereignty and independence of the Netherlands by Philip II. after their long and sanguinary struggle for liberty marked the beginning of a historic era in the New World. On the evening of 29 July 1609, Champlain at the head of a band of Montagnais Indians encountered a war party of Iroquois on the west bank of Lake Champlain near Ticonderoga in Essex County. The next morning the unfortunate Iroquois were introduced violently to gunpowder and the white man's sway and the white man's way opened in the Western Hemisphere.

One 3 September following, Hendrik Hudson sailed into New York Bay on the eighty ton ship Half Moon, with a crew of eighteen men, half English and half Dutch. Hudson's son accompanied him. Hudson was an Englishman who had twice essayed to reach far Cathay by the Northwest passage. The Dutch East India Company, which was the pioneer company to take advantage of discoveries of new territory and whose powers were elastic for the colonization of new empires and the government thereof, persuaded Hudson by the offer of a seductive pecuniary inducement to lend his ability and fearlessness as an explorer to their enterprise. Accordingly on the fourth day of April 1609, he sailed from Amsterdam to seek for the third time the passage to India by the north. Again he was thwarted by gigantic icebergs and impassable seas of frozen ice which blocked his way. He changed his course to the westward, passed Greenland and Newfoundland, and sailed South until he descried the promontory of Cape Cod. He designated the region beyond it New Netherlands and for a long time the Dutch considered Cape Cod as the northeast boundary line of their territorial possessions. Continuing on his way, Hudson made Chesapeake Bay, but from letters which he had received from John Smith he understood his countrymen were in possession by right of discovery. He put about and headed to the north. He discovered Delaware Bay and river which he christened the Dutch South River. He fixed the southern boundary of New Netherlands from that point. On the second of September the Highlands of Navesink turned up over the horizon to the north. For a week Hudson loitered in the vicinity of Staten Island, which he named — an object of curiosity to the Indians as his ship was of wonder to them. September twelfth Hudson sailed into the Upper Bay and de Groote River, which was called by the natives Shatemuc or Mohicanituck, subsequently the North River, in contradistinction to the South and the East, and eventually the Hudson River in honor of the distinguished explorer who discovered it. Hudson had explored the neighborhood from Sandy Hook to Amboy, indulged in amiable converse with the aborigines, and proceeded on his course in search of the Northwest passage to India by the way of the Hudson River. It was only after eleven days' sail when he reached the end of navigable waters that he was compelled reluctantly to abandon the undertaking. With a deep feeling of disappointment he turned the prow of the Half Moon to the southward. The reports of his success, however, were forwarded to Holland and stimulated further enterprises in the way of exploring and colonization, while Hudson was detained at Dartmouth, England, whither he had put in, owing to the threatened mutiny of his crew.

The following year the fur merchants of Holland despatched another vessel to the River of the Mountains, which for the time was called the Mauritius after Prince Maurice, the stadtholder. In 1611 Hendrik Christiaensen of Cleves sailed for the same destination and returned with two young Indians, the sons of a Manhattan chief. In 1612 three Amsterdam merchants, Hans Hongers, Paulus Pelgrom and Lambert Van Tweenhuysen, sent two ships, the Fortune and the Tiger, to open up trade along the Hudson River. The Tiger was accidentally burned at Manhattan Island and Adriaen Block, its commander, during the winter of 1613–14, built a new vessel, the Onrest, of eighteen tons, the first to be constructed on Manhattan Island.

Two settlements had already been started in what is now the State of New York; one by Christiaensen on Castle or Patroon's Island, on the west bank of the Hudson a mile or two South of the present Albany, called Fort Nassau; the second on Manhattan Island, covering the space midway between the Battery and Rec-

tor Street on the west side of Broadway. Block in the meantime had sailed away to the eastward in the vessel he had built, discovered the island which bears his name, drew a map of all the region, and in consequence secured from the States-General a charter for the "New Netherlands Company" under which he enjoyed the monopoly of trade in that region until 1621, when the charter expired. In the latter year the Dutch West India Company came into existence, with a charter granted by the States-General of Holland. Two years later additions were made and an act of amplification given. Under this charter, which was to endure for 24 years, the company was permitted to trade with the West Indies, Africa, and "other places"; all other inhabitants of the United Netherlands were prohibited from trafficking with those countries. It was permitted to appoint governors and other officers; to determine the forms of administering justice, to make treaties and enact laws. Their first packet, the New Netherland — under the superintendence of Cornelis Jacobsen May — which plied her ocean trade for thirty years, brought in May 1624 over thirty families, eighteen of whom established a settlement at Fort Orange near Albany under Adriaen Joris. Two years later two ships loaded with emigrants, agricultural implements and domestic animals, left Holland for Manhattan Island, where the company had decided to erect a larger colony and their headquarters for New Netherlands. With the later colonists came the director-general, Peter Minuit, who the following year, 1626, purchased the island of Manhattan, containing 22,000 acres, from the Indians, for 60 guilders, or about 24 dollars.

The Colony "boomed" from the beginning and the stock of the West India Company sailed upward. Under "the Freedoms and Exemptions" act, adopted in 1628, the company gave authority to every person who should send over a colony of 50 souls above the age of 15 years, the title of "patroon" and the privilege of selecting tracts of land, except on Manhattan Island, eight miles in length along the river and as far inland as he pleased. It was obligatory for the patroon to be a member of the company. He was looked upon as a feudal prince. His possessions were exempt from taxation for ten years. The colonists were prohibited from manufacturing woolen, linen or cotton cloth. Under authority thus conferred Kiliaen Van Rensselaer, of Amsterdam, a diamond and pearl polisher, obtained, through Sebastian Jansen Krol, who had come out with Jan Huyck two years before as "a consoler of the sick," a tract of land 20 miles in length, from Baeren Island to Smacks Island, and 24 miles on either side of the river "stretching two days' journey into the interior," constituting the greater part of the present counties of Albany, Rensselaer and Columbia. Michael Pauw purchased from the Indians, Staten Island and the land upon which Jersey City and Bayonne are now built. With the development of the land and trade the inevitable occurred. The patroons practically became rivals of the West India Company in the fur trade. As the business of the latter diminished the wealth of the former expanded. Minuit, unable to readjust the differences, was recalled. For two years the office was vacant. It was then filled by Wouter Van Twiller, a name that has been rendered synonymous with farce, burlesque, contempt and arrogance. Van Twiller had married a niece of Van Rensselaer and was an administrator of fair parts. He began the construction of a new fort; he built the first church edifice; a bakery, a brewery; he substituted brick for frame houses and new windmills for old. But his plans failed to mature because of his peculiar disposition. Dominie Bogardus, who had accompanied him to this country in the same ship, stigmatized him as "a child of the devil" and threatened to "shake" him "from the pulpit as would make him shudder." Van Twiller was removed under charges in 1637 and left office, as did many of his successors, with a fortune he had accumulated in service. His successor was William Kieft, a man of slender abilities and an embezzler, whose ten years of service were conspicuous for strife — with the English and with the Indians. Like Van Twiller, Kieft was deficient in the art of conciliation. His position was too big for him to handle. He gives a discouraging report of the condition in which he found the colony; farms were barren of tenants and of cultivation or thrown into common; trading vessels in poor shape; houses out of repair; only one saw-mill out of three was in operation; the fort at New Amsterdam, for whose repair his predecessor had received 4,172 guilders, lay in a state of dilapidation and the magazine was scarcely discoverable.

The first English flag seen in the vicinity of New York floated from the vessel commanded by Captain Samuel Argall, the roving buccaneer, who in 1612 had captured Pocahontas and held her as a hostage for the good behavior of her father. Argall had been despatched in 1614 on an extraordinary expedition by Sir Thomas Dale, governor of Virginia, to dispossess the unfortunate French people who had settled at Acadia. On his return from this successful buccaneering expedition, Argall paid his respects to the Dutch. He proceeded up the Hudson River to Albany, forced a surrender in the name of the English king, and sailed away. New Amsterdam likewise submitted to Argall's demand, but as soon as his vessels disappeared through the Narrows, the Dutch flag replaced the English ensign as had been done at Albany. In 1633, Jacobus Eelkens, the Dutch commissary at Fort Orange, brazenly attempted to establish English trade on the Hudson, but the scheme was crushed at its inception. The New Englanders were not satisfied with their possessions but coveted the more prosperous settlements of the Dutch to the westward. In 1638 Kieft had issued a prohibition against the English trading at Fort Good Hope near the present Hartford, which had been built in 1623. Shortly afterward, owing to the insolence of the English, an order in Council was issued, to strengthen the post, to maintain Dutch supremacy. We first hear of English settlers in New York in 1640 on Long Island. They had crossed the Sound from Connecticut. When the English audaciously confiscated land, near Fort Good Hope, which the Dutch had prepared for planting, and brutally chastised farmers who tried to plant, Kieft threw a detachment across the Sound in retaliation and dispersed an English settlement at Oyster Bay.

But Kieft found more trouble on his hands.

The Indians of New Jersey betrayed signs of restlessness toward the governor of New Netherlands; he was threatened by the Swedes at the south; he realized the unfriendliness with which the cavaliers of Virginia, Maryland and Delaware regarded his colony; he could expect no favors from the Puritans on the east. At this crisis he unwisely provoked a quarrel with the Indians by demanding tribute in maize and fur on the ground that the Dutch had supported them in defense of their enemies. From the day Champlain introduced gunpowder to the savages on Lake Champlain, the red man of the forest had sedulously and successfully cultivated its acquaintance. So that when Kieft imprudently attempted to suppress the sale of guns and their accessories to the Indians, turbulence broke loose along the New York frontier. For three years the bloody strife continued, during which the Dutch in New Amsterdam were driven for protection under the guns of the fort and were reduced to much distress by the aggressive operations of the Manhattans, from the north, the Long Island Indians from the east and Delawares from the south and west. Roger Williams brought about an interview between Kieft and the sachems, but the peace which followed was of brief duration, for hostilities were resumed more savagely than ever before the end of the year. The Indians were bent upon a war of extermination of the whites. They felt their power, the force of their numbers and were thirsting for revenge. "When you first came to our shores you were destitute of food" exclaimed a Sachem before a treaty council. "We gave you our beans and our corn. We fed you with oysters and fish. And now for our recompense, you murder our people."

In 1643 "the first germ" of our Federal Constitution was planted by the formation of a league for self government and common defense by the colonies of Massachusetts, Plymouth, New Haven and Connecticut. For the time it was a powerful organization. To it, Kieft appealed in vain for aid, to carry on his Indian war. The confederacy was organized as much to make aggressions upon the thrifty Dutch as for defense against the Indians. Matters were going badly for Kieft until he solicited the support of Captain John Underhill, a valiant warrior, under whose skill and energy, an able-bodied force was raised, which encountered and defeated the Indians in several pitched battles. Peace was eventually assured in 1645 through the intervention of the Iroquois. Kieft failed to profit by the lesson. The act that led to his recall was the most infamous in Dutch Colonial annals. Without the slightest provocation, he crossed to the west bank of the Hudson, with the soldiers from the fort, a mob from the streets, and privateersmen and sailors from the harbor. Under cover of darkness he fell upon a band of peaceable and unsuspecting Indians at Pavonia and massacred men, women and children indiscriminately. Kieft left for home with a fortune. The ship was wrecked off the coast of Wales and governor and fortune went down together.

We now come to the much misrepresented and misunderstood Petrus Stuyvesant who arrived at New Amsterdam 27 May 1647, two years after his appointment as director-general. Stuyvesant was the son of a Friesland clergyman, had been educated to the army and navy as well, had lost a leg in the attack on the Portuguese island of Saint Martin and wore as a substitute a wooden one, that was girdled with silver bands. He was 45 years of age, overbearing in manner, autocratic in speech, prompt and decisive in action and a devout churchman. He conscientiously attempted to carry out the instructions that directed him to guard against aggressions on the colony's boundaries, to preserve peace with the Indians and to stimulate the growth of villages by the colonists. He found the colony much out of repair and the colonists next to demoralized. The dominating spirit that pervaded the West India Company and all that were connected with it, to the colonists themselves, was personal gain. New Amsterdam and Fort Orange or Aurania as it was sometimes called, were flooded with an aggregation of unscrupulous merchants and traders, who robbed the Indians on one side and their customers on the other. The example was established by succeeding directors-general and the plain people emulated that example. Stuyvesant inherited the turbulence and the dissatisfaction left by his predecessor and struggled with it courageously and with a hand so firm as to incite unpopularity among many whose plans he thwarted. A year before his arrival, Kieft had served notice on New England that the English "without provocation" had invaded New Netherlands, usurped divers places, done injuries and not given satisfaction, and that unless reparation were given "such means as God affords" shall be employed "manfully to redress ourselves." Stuyvesant for five years diligently attempted to establish pacificatory measures with the most powerful rivals of the Dutch, the English, and finally in 1650 by repairing personally to Hartford secured a treaty that fixed Oyster Bay, on Long Island, the western boundary of the New Englanders and Greenwich on the mainland.

In the meantime internecine quarrels aroused all the choler and tyranny in his nature. Without funds, the internal improvements he had in contemplation could not be carried out. He had seen how Kieft had quarreled with his "Eight Men," and as a concession for his taxation scheme he ordered an election, allowing the settlers in Manhattan, Brooklyn which had been established in 1645, Amersfoort and Pavonia, to elect 18 individuals from whom the governor and his council should select nine, who were to confer with the director on all measures tending "to promote the welfare of the commonalty and the country." Between the director and "the Nine," dissensions arose over finances. The latter refused to provide money for the repair of the fort, claiming the Company was responsible for that expense. They objected to Stuyvesant's management; complained of the heavy assessment levied upon trade, and when he peremptorily refused permission for the people to assemble, they made a house to house canvass. The director ordered delegates from the militia and "the Nine" ordered a journal to be kept by one of their number, Adriaen Van der Donck, and forwarded eventually to the home authorities. Stuyvesant blazing with wrath arrested the writer, threw him in prison on the charge of libeling the government and seized the papers. The controversy was carried

with more or less acrimony on both sides to Holland; petitions were despatched across the sea complaining of the unreasonable and arbitrary exercise of power by the director. Stuyvesant in the meantime played into the hands of his enemies by his reduction of the Swedish possessions in Delaware. As the dissatisfaction of the Dutch burghers against him expanded, sympathy for him on the part of English settlers increased. He had established a weekly market in New York; in 1652 the city was incorporated; a year later the palisades were constructed to the north of the present Wall Street from the East to the North River; four years later citizenship was created and the city was surveyed, streets were regulated and named and several of them paved.

Under Stuyvesant's administration religion was encouraged and fostered. As early as 1626, Sebastian Jansen Krol and Jan Huyck who had originally sailed to the country as "consolers of the sick" are found, on the Sabbath, reading texts out of the Scripture and the creeds to persons who would attend. Two years later, in 1628, Michaelius, a minister of the Reformed Church, organized the first Dutch church in the New Netherlands with 50 communicants. In 1633 arrived Everardus Bogardus who sailed to this country on the same vessel with one governor, Van Twiller, to return home on the same vessel with another, Kieft, only to meet his fate at sea. His quarrels with both have become historical. Along in 1640 Dominie Johannes Megapolensis preached in the church which Kieft had built within the fort, before proceeding to his charge at Fort Orange, the present Albany. The Reverend Johannes Backerus, formerly a clergyman at Curaçoa, in 1647, superseded Dominie Bogardus in the pastoral charge of the Dutch church. New York had not escaped the wave of religious intolerance that had rolled over Europe during the preceding half century. An ordinance was adopted by the Dutch in 1640 that prohibited the exercise of all other religions except the "Reformed as it is at present preached and practised by public Authority" in the United Netherlands. The following year, however, this bigoted mandate was temporarily revoked. Father Jogues, the first Catholic missionary to New Netherlands, found that the colony harbored Catholics, English Puritans, Quakers, Lutherans, Anabaptists termed "Mnistes" (the Mennists or Mennonites) and Dutch Reformers. He reported an order was in force denying "public worship" to all but Calvinists. In 1654 the application of the Lutherans to erect a church in New Amsterdam was refused; "no doctrine shall be encouraged in the colony" but "the true reformed," ruled the director-general. The English settlements repudiated the teachings of Megapolensis who in 1649 had succeeded Backerus and who claimed the Classis of Amsterdam in Holland exercised spiritual jurisdiction over the colony. Quakers were arrested, beaten with ropes, were fined and imprisoned for their presumption in preaching their heresies.

The outbreak of war between Holland and England called in play all of Stuyvesant's great ability as an executive officer. The city was put in a state of defense. He had established the city of New Amsterdam and appointed the burgomasters, the schepens and fiscal. He now attempted to adjust affairs with New England but in vain. Indian outbreaks excited the colony for several years. An uprising near New Netherlands was followed by massacres at Pavonia, Hoboken and Staten Island. In three days 100 Dutch colonists were killed, 150 were taken prisoners and a financial loss of 200,000 guilders, $80,000, was sustained. Devastations at Esopus and the destruction of Wiltwyck were not the least disturbing problems he encountered in dealing with the Indians.

In the meantime the villages of Jamaica and New Haerlem had been created; a municipal court was established at Esopus, known as Wiltwyck; Arendt van Curler, long loved and trusted by the Indians as "Corlaer," had purchased the great flats at Schenectady and the colony was spreading forth like a blossoming plant, north, west and southwest of Albany.

The aggressions of the "malignant English" had been a source of annoyance to the Dutch for years. Cromwell at one time threatened to seize New Netherlands. In 1657 the commissioners of the United New England Colonies conceded Oyster Bay and Huntington to the jurisdiction of New Haven and three years later Huntington and Seatauket. In 1662 Connecticut laid claim to Westchester in spite of the provisional treaty. Charles II. had granted to the younger Winthrop, Massachusetts Bay, including Connecticut, and to his brother James, New Netherlands; the fact that a great part of this territory was not his to give, but belonged to the Dutch, was not included in the consideration in the least. About this time John Scott appeared on the scene. He produced orders for the stringent enforcement of the British navigation laws in the colonies, claimed that Long Island belonged to the Duke of York and proceeded to place the English Long Island towns under one organization, of which he was elected "president." When he attempted to seduce the Dutch towns he encountered the strong arm and the stubborn will of the director-general. The contest was acrimoniously conducted, was protracted and only ended by the appearance, 29 Aug. 1664, in the bay, of the English fleet under Colonel Richard Nicolls, who had been ordered by his royal master, the Duke, to take possession of the Dutch province, to reduce the Dutch to entire obedience, "to put them out of capacity of doing such mischief" as they had perpetrated in other quarters. It was repugnant and mortifying to Stuyvesant's courage to surrender his charge without firing a shot and, like a soldier of high spirit, he prepared to make determined resistance, in spite of the appeals of the city authorities and the clergy. "I would much rather be carried out dead," he exclaimed. Stuyvesant appealed in vain for help and for several days cleverly delayed the inevitable. He only yielded when Nicolls entered the harbor with his ships and an overpowering force, and he regretfully signed the articles of capitulation that had been agreed to by the magistrates. On 3 September, New Amsterdam became New York in honor of the Duke, the name of the fort was changed to James, also in honor of the Duke and three weeks later Fort Orange surrendered and was called Albany, in honor of the Duke. One of the inconsistencies conspicuous in the seizure of New Netherlands by the English is that at the time peace prevailed between England and Holland.

The province received the name of New York. Its population was estimated from 6,000 to 10,000 souls. Municipal officers continued in power, but no more elections of magistrates were to be held by the people. Stuyvesant had insisted upon the guaranty of property and civil rights and freedom of worship — the Church of England Service to be held in the Dutch church at New York upon the termination of the service of the Reformed Church. Court proceedings were to follow English models. The province felt the direful effects of the next ten years of European wars. On 30 July 1673 with war under way between Holland on one side and France and England allied, a Dutch fleet under Cornelis Evertsen and Jacob Benckes suddenly appeared off Staten Island. Captain John Manning, in the absence of Governor Francis Lovelace, who had succeeded the Duke of York's personal representative, Colonel Nicolls, was not disposed to offer resistance, for his soldiers refused to fight and his own people spiked his guns. He surrendered, and the name of New York was temporarily changed, and that of the fort to "William Hendrick." Anthony Colve was proclaimed governor of the province. Under the treaty of 1674 New York was restored to the English. Sir Edmund Andros, an intelligent and wise officer, was appointed governor. In 1678 he describes the province as containing 24 towns or villages with 20 churches, specifies its products and exports as provisions, tar, furs and lumber, fixes the value of estates at £150,000, and the number of men capable of bearing arms at 2,000. Under his regime the navigation act was enforced; friendship with the Indians was cultivated to neutralize the influence of the French; a classis of the Reformed Church was established 1679 in New York to ordain ministers, and the governor endeavored to individualize New York as "the most English in sentiment of the American Colonies." Owing to disputes with New Jersey, complaints were filed against Andros with the home authorities. He was recalled, and exonerated; in 1688 he returned under a viceregal government to consolidate the Northern colonies. In the interim the office had been filled by Thomas Dongan, an Irish soldier, a Catholic and a discreet and conservative leader. He brought instructions to issue writs for an Assembly; and the people now saw in reality the culmination of hopes begun during Stuyvesant's time — the possibility of popular franchise. Accordingly 17 Oct. 1683 the representatives of the people of New York met for the first time in Assembly in New York city. The sessions continued until 3 November. It was ordained that Assemblies should convene triennially. In 1685 a charter was granted to New York and in 1686 to Albany. The hopes of the colonists for better things were dashed to the ground; the Assembly promised by the Charter of Liberties and Privileges never convened, for in February 1685, Charles II. died, his brother James the Duke ascended the throne and as James the King repudiated the acts of James the Duke; the charter was vetoed, and the Assembly abolished. Dongan had fallen under the royal displeasure by his failure to push forward the doctrines of the Church of Rome and was recalled.

Governor Andros was in arrest at Boston when the news arrived that James had been dethroned and the lieutenant-governor, Francis Nicholson, lacked energy and decision for the crisis. People moreover distrusted him. Wild and exciting rumors were abroad in the land. Stories were circulated that the Catholics were to join hands with the French and overturn the existing order of things. Jacob Leisler was a prosperous merchant and captain of one of the train bands. He had been born at Frankfort and had seen service in the German army. The people turned to him. But the three councillors remained loyal to Nicholson. Leisler and his friends, fearful of the intrigues of the Catholics, proclaimed William of Orange, king. Ten members of the Assembly were appointed by Leisler as a committee of safety, and Leisler was declared by them to be governor. He carried his authority with a high hand. He usurped the functions of the lieutenant-governor and claimed the title; he opened letters addressed to Nicholson and arrested and imprisoned those who refused to obey him. When French invasion upon the destruction of Schenectady in 1689 was imminent, he displayed great energy, declared himself as the acting governor and forced recognition from Peter Schuyler, mayor of Albany, who had resisted the authority of Jacob Milborne, son-in-law of Leisler, whom he despatched up the Hudson with an armed force to subdue the thriving city. On the strife between Leisler on one side and Captain Richard Ingoldesby and Colonel Henry Sloughter, who had been appointed governor by William and Mary on the other; on Leisler's imprudent actions, it is not necessary to dwell. Eventually he was forced to submit. Pursued by vindictive enemies, he and Milborne died as martyrs. Sloughter, stupefied with rum, signed their death warrants and they were hanged near the site of the present *World* building in New York city 16 May 1691. Leisler was unquestionably a sincere but misguided man. Four years later Parliament reversed the attainder of Leisler and his associates. Lord Bellomont, afterward the enlightened governor of the province, declared that Leisler and his son-in-law were "not only murdered but barbarously murdered."

The history of the province for the following 84 years is conspicuous for brawls between the governor and the Assembly; for efforts to disseminate the doctrines of the Episcopal Church and to weaken the influence of the French and of the Catholic Church; to develop the land and the fur trade; to increase the growth of the towns, to preserve peace with the Indians; to cultivate privateering, and to wink at piracy; to reconcile differences with neighboring colonies. Much depended upon the sincerity, honesty and integrity of the governors. In the whole line of administrators from Nicolls to Tryon, under English rule not more than three governors can be cited in whom those three traits can be found. The governor's power was absolute. He not only made the laws but interpreted and executed them and when necessary unmade them. He usurped the prerogatives of the Assembly and of the courts; his Council were mere automatons who danced when he pulled the string. No act of the Assembly was placed on the statute book without his signature, and no decision of the court was valid until he, as chief justice, passed judgment; and in this respect he exercised powers denied to the king for his

majesty, while permitted to sit on the king's bench, was prohibited from expressing judgment. Time and again the governor was threatened with removal; now and then charges were preferred against him and once the grand jury was urged to indict him for high treason. It is a sad commentary on the record, that every colonial governor who took office poor left office a wealthy man. There were three notable exceptions, the Irish earl, Lord Bellomont; Robert Hunter, the friend of Addison and Swift; and William Burnet, son of the bishop of Salisbury. The province had already become the haven of the persecuted of foreign countries. Between the years 1678 and 1696 the population of New York city had nearly doubled — from 3,400 to 6,000; that of the province had increased to nearly 30,000. The infamous practice of transporting felons to America and the degrading slave trade produced the most pernicious effects upon the cause of labor, stamping it with the stigma of disgrace in the one instance and involving a contraction of wages in the other.

Under General Hunter was tried the experiment of colonizing the Palatines. The scheme originated with English politicians who saw in it vast profit in developing the British commercial resources at the same time menacing French supremacy by strengthing the frontiers. Settlements were established first at Livingston's Manor, and subsequently along the Mohawk and in the Schoharie region. The experiment involved a loss of £100,000 to its projectors.

In 1732 occurred the memorable struggle between Rip Van Dam, the senior councillor, and Governor Cosby. The original cause was puerile and insignificant, and involved only a few pounds, a fraction of the salary Van Dam claimed during the 13 months he acted as governor; it culminated in one of the most glorious episodes in history and established the principles for the freedom of the press in this country for all time, through the courage of John Peter Zenger, editor, and the brilliant scholarship of Andrew Hamilton, his advocate in the famous trial for libel. Nine years later, the province was thrown into paroxysms of alarm over the so-called "Negro Plot." Several mysterious fires occurred in New York about the same time and the impression got abroad that negroes had kindled them with the ultimate determination of burning down the town. The only basis for the suspicion was the unsupported testimony of an ignorant immigrant woman who was bound out to the keeper of a disreputable resort. Every negro became a suspect and large rewards were offered for the conviction of an incendiary. Before the frenzy ended, under the judgment of the court, 13 unfortunates were burned to death, 18 were hanged and 70 transported.

For years, more or less apprehension prevailed over French invasion. The French wielded greater influence over the Indians through religion and princely presents. Settlements had been established at Oswego and at Niagara, and the governors were periodically at their wits' ends to protect them. November 1745, instigated by the French, a band of redskins rushed upon Saratoga — after Fort Hoosick had surrendered — killed the brother of Peter Schuyler and a number of others, spread destruction over the surrounding country and carried off to Canada a number of captives. The Assembly of New York then followed the example set by Massachusetts and offered a bounty for Indian scalps. England had been remiss to a degree in neglecting even ordinary protection for its settlers. The home ministry permitted France to fortify and hold Crown Point, in spite of the protests from the province, whence war parties darted on their incursions of devastation, desolation and death.

Governor Clinton who succeeded Clarke as governor in 1743 was a sailor by profession and carried into the office all the old time martinetism of the quarter deck. He attempted to overcome England's handicap with her redskin neighbors. In August and September 1746 he held a council at Albany with the Iroquois with the intention of establishing an alliance and to counteract the marplotting of the French and the Jesuits. To strengthen the bonds of friendship and as an effective object lesson, Sir William Johnson, the English Indian agent for New York, appeared in the full garb of a savage, paint and all, and walked as an Indian chief at the head of the Mohawks. Owing to the illness of Governor Clinton, Cadwallader Colden explained to them that the French had been defeated at Annapolis; and that troops from Massachusetts, Connecticut and New Hampshire had captured Louisberg. He informed them that the English king had sent troops enough to take Canada from the French and urged them to join the English in the undertaking. Orations were thereupon delivered, belts exchanged and presents divided; the Indians gorged and guzzled, warbled and danced, and agreed to join the English procession, and the northern part of the province was overrun with war parties who scalped and spattered blood, of male and female, young and old, the strong and the helpless, with unbridled ferocity. Governor Clinton accumulated a princely fortune during his ten years' service as governor and could well afford to quarrel with his Assembly, as several of his predecessors had done over the permanent support bill. His successor, Sir Danvers Osborne, hanged himself with his handkerchief 12 Sept. 1753, five days after his arrival in New York.

James DeLancey, lieutenant-governor, one of the best equipped men in the province for the position, succeeded him. He had been born in Albany and was the first governor to the manner born. He presided over the Congress at Albany in 1754 that contemplated union among the colonies, and opposed the plan. The treaty of Aix la Chapelle was a dead letter so far as the colonies were concerned, for French aggressions were more exasperating than ever. With the outbreak of the French and Indian war, Sir William Johnson, who had married the sister of the Indian chief Joseph Brant, and who never had commanded a company of troops on the field, was placed at the head of a force of 3,400, who marched to the northward. At Lake George on 8 Sept. 1755, occurred the battle which brought a baronetcy and a fortune to Johnson, deprived the officers who really won the victory of credit, led to the death of the celebrated Mohawk, Hendrick, and put to rout the French forces under the accomplished French general, Dieskau.

The main incidents in the French and Indian

war were the capture of Fort Oswego by the French general, Montcalm, 14 August 1756; the surrender and massacre at Fort William Henry at Lake George on 9 August 1757 where Montcalm with 8,000 French and 2,000 Indians overcame the garrison of Colonel Monroe of 3,000 men; the surrender of Fort Frontenac to Col. John Bradstreet, and the surrender of Fort Niagara to the English 20 July 1759.

The birth of liberty in the State of New York practically occurred in the Colonial Convention to consider the Stamp Act, 7 Oct. 1765. With the accession of George III., 25 Oct. 1760, a new conflict broke out between the colonists and the authorities. All commissions expired with the sovereign. It was now contemplated to permit the judges to hold office only "during his Majesty's pleasure" instead of "during good behavior." Up to 31 March 1774, when the Boston Port Bill became a law, agitation throughout the provinces had become more and more pronounced and the people more and more unsettled. The battle of Golden Hill in New York city in 1770 had inflamed the public mind to the possibilities, and the representatives of the Crown in their constant collisions with the Sons of Liberty over the destruction of their liberty pole contributed naught in diminishing the drift of popular sentiment. On 23 May 1774, New York published its declaration of rights at Fraunce's Tavern in New York city. Two months later delegates were chosen for the first Continental Congress which convened in Philadelphia 17 Sept. 1774. On 1 May 1775 the committee of 100 was appointed as the successor of the New York Committee of Correspondence and the Committee on Inspection, respectively. The constitutional government had gone out of existence. The sentiment of the English party in New York city was naturally in sympathy with England; the old Dutch settlers, with their bitter remembrance of the 100 years of English rule, were almost unanimously in favor of revolution, but when the second Continental Congress convened in Philadelphia 10 May 1775, and the country had tasted all the horrors of war, there were members, especially from New York, who were still hopeful that the manifold grievances might be redressed. Grave events were happening with great rapidity. Fort Ticonderoga had been surprised and captured by Ethan Allen and Benedict Arnold 10 May; two days later Crown Point surrendered; within a week Arnold had captured St. Johns, Canada, and William Tryon the last English governor, who five years before had succeeded Lord Dunmore, sought refuge on the British gunboat Asia in the harbor of New York. Throughout the war New York was the real battle ground; topographically and strategically its position was recognized as of the utmost value to English and American as well. The English plan of campaign was based upon that of the French of 1689 and of Montcalm in 1757; namely, to break the back of the province by an invasion operating from the north and from the south along the valley of the Hudson. It was this objective that brought Burgoyne to America in the summer of 1777, when the American forces and American people were disheartened by successive defeats that included the battles of Long Island and the evacuation of New York city; the defeat at White Plains and surrender and massacre at Fort Washington. Three of the most important battles of the Revolution were fought on the soil of New York; that of Oriskany, 6 Aug. 1777, which practically shattered the right arm of Burgoyne, and that of Walloomsac, for many years mistakenly called Bennington, which shattered his left arm, both of which contributed immeasurably to the culminating defeat at Saratoga where the first British army in the history of England lay down its arms to an army composed of farmers.

Sir Henry Clinton had started from New York only too late to assist Burgoyne and had captured Forts Clinton and Montgomery in the Highlands of the Hudson 6 October, eleven days before the surrender. On 16 Oct. 1777, the British Colonel, Vaughan, ascended the Hudson to Kingston, which was burned without the slightest provocation, leaving a stigma upon the British name for pure vandalism that has never been effaced.

With Burgoyne's surrender, New York State was relieved of large standing armies, but was called upon to encounter straggling foes that menaced the frontiers and exposed towns to the close of the war. During the campaign of 1776 the safety of the people was indubitably secured by the tireless energy and countless resources of General Schuyler, but with his retirement from the Continental army as commander of the Northern District, the frontiers were left to shift to a large extent for themselves, and the Indians under Brant with the Tories under the bloodthirsty Butler swept over them with torch and scalping knife, meeting with feeble resistance, until Congress and General Washington selected John Sullivan to destroy their crops and burn their villages from the Chemung to Niagara.

In October 1780 the Schoharie and Mohawk valleys were ravaged by a force of 800 Indians and Tories under Sir John Johnson. With the exception of the slight skirmish at Johnson Hall where Col. Marinus Willett put the enemy to rout, New York saw no more active fighting except sporadic brushes here and there between the militia and straggling bands of Indians.

The constitutional history of New York dates from the adoption of the Declaration of Independence. The Provincial Congress which had been elected in April met in the city of New York 14 May 1776. Before the convention adjourned the subject of independence was considered, and it was resolved that it was the sense of the Colony that the people desired to continue dependent upon Great Britain. As soon, however, as it was known that the Continental Congress recommended that each colony should establish its own form of government, a decided change of sentiment occurred in New York. When the newly elected convention assembled at White Plains 9 July 1776, the old regime had ceased to exist, and the New York Congress became "the convention of the representatives of the State of New York," the Declaration of Independence was speedily ratified, and a committee was selected of which John Jay was chairman, to draft a constitution for the State of New York. The enemy seriously interfered with the plans of the Convention. New York had been abandoned. The British men of war patrolled the harbor within seven miles of the place where the constitution framers were

at work. Courts of law had been abolished, but the Convention ordered that all magistrates and civil officers who were affected toward independence should continue to exercise their duties and that processes hereafter must issue in the name of the people of the State of New York.

The draft of the constitution was submitted 12 March 1777. It was adopted 20 April and an election was ordered to be held in June. The sentiment of the constitution was decidedly English and its tone was aristocratic. It discredited the office of governor and it distrusted the people. Its abiding faith in the judiciary stands out in a strong light. It was liberal in its religious sentiments in that it permitted "the free exercise of religious profession and worship without discrimination or preference of all mankind." Slavery was still supported, although Gouverneur Morris and John Jay, who had been most instrumental in drafting the instrument, had attempted to move for its gradual obliteration. Its two weak features were the Council of Appointment, which was supposed to be a check upon the governor, and the Council of Revision, which was supposed to be a check upon the legislature. The Constitutional Convention of 1801 was called to determine the jurisdiction of the governor and the Council of Appointment in the matter of patronage. The decision of the Convention divided the responsibility equally between the four Senators who constituted the Council of Appointment and the governor. The two obnoxious councils, Revision and Appointment, were abolished by the constitution of 1821 which at the same time enlarged the area of the elective franchise by removing the property qualification. The weakness of the articles of confederation that had become apparent within a year of their adoption, threatened to shipwreck the country unless a strong form of government was organized and substituted in its place. General Washington and Alexander Hamilton had been agitating the necessity for a more powerful and cohesive instrument. On 17 Feb. 1787, the Assembly of New York adopted joint resolutions instructing the delegates of the State in Congress to move that a convention be held for the purpose of amending the Articles of Confederation so as "to render them adequate to the preservation and support of the Union."

Messrs. Robert Yates, John Lansing, Jr., and Alexander Hamilton were appointed delegates to the Federal constitutional convention which met in Philadelphia on the second Monday in May 1787, and which concluded its work 17 September. Messrs. Yates and Lansing withdrew and Hamilton was the only delegate from this State who signed the new constitution. The State convention to act upon the new constitution convened at Poughkeepsie 17 June, and adjourned 26 July. Ten of the thirteen States had ratified the Constitution — one more than the number necessary — with New York rebellious. George Clinton, governor of the State from 1777–95, appeared as the most resourceful opponent of the new Constitution and led the anti-federalist forces on the argument that New York was too powerful and wealthy to place herself on a par with States not her equal in income and resources. Alexander Hamilton and Robert R. Livingston were the strongest advocates of the new Constitution. In July notification was officially made that Virginia and New Hampshire had approved the new Constitution, and the Federalists thereupon offered a resolution "that the Constitution be ratified in full confidence that the amendments proposed by this convention will be adopted." The resolution was adopted 30 to 27, eight members, including Governor Clinton, declining to vote. From this time forth two parties existed in the State of New York, the strict and the loose constructionists. The State of New York, owing to the failure of the legislature to agree in the choice of electors, lost its vote for President at the first election under the Federal Constitution.

The first political struggle in the State occurred in 1792 over the election for governor, when Governor Clinton by a fluke defeated John Jay. New York had experienced a number of disputes with her neighbors over boundary jurisdiction, especially with New Jersey, Vermont, New Hampshire and Massachusetts. New York was the first of the States to cede lands belonging to her to the United States for the encouragement and development of immigration. Within a space of seven years, 5,500,000 acres of land within the State had been thrown open to settlers, bringing to the State treasury $1,030,433. Population fairly jumped, and it was necessary to create a number of new counties north and west of Albany. Internal improvements, turnpikes, and the development of waterways were constant subjects of discussion, and these subjects received an extraordinary stimulus in 1807 when Robert Fulton made the first trip with his steamboat on the Hudson River between New York and Albany. Three years later a commission was appointed to survey a route for a canal to Lake Erie. On 16 April 1816, commissioners of construction were appointed, and in 1817 commissioners of the canal fund were organized. As the construction of the canal proceeded a number of counties were opened to the right and left, and when the canal was completed in 1825, the population of the State had increased to 1,500,000.

Up to the outbreak of the second war with Great Britain, political struggles in New York were marked by fierce acrimony. Never was hostility more bitterly displayed and personal vituperation carried to greater excess. Hamilton had fallen in the duel with Burr, and from that hour dueling was banished as a social evil in the State of New York. The Clinton family, the venerable George, who had been a candidate for President against Madison, through the wire pulling of his brilliant nephew DeWitt Clinton, had been elected vice-president, and opposed the Federal administration of President Madison, whose New York representative seems to have been Governor Daniel D. Tompkins, an adroit politician and an able man.

At the opening of the presidential campaign of 1812, DeWitt Clinton aspired, through his Republican affiliations, for the presidential nomination and was nominated by a number of his friends in New York city; but on 18 May, President Madison was unanimously nominated. When Congress declared war in June, the President issued a patriotic proclamation which rallied to his support the entire Republican party and forced Clinton to abandon his own party and consort with the Federalists.

During the second war, Governor Tompkins

stands out as strong a character as George Clinton during the War of the Revolution, and like the first war governor of the State, he was selected, in honor of the distinguished services he had rendered to his party and State to serve as vice-president of the United States with James Monroe from 1817 to 1825, during "the era of good feeling."

Judge Tompkins presided over the Constitutional Convention of 1821. With the adoption of this Constitution, the Federalist party went out of existence for all time. New York State, and the new conservative element under the leadership of Martin Van Buren and DeWitt Clinton took charge of the party machinery.

It was during the term of DeWitt Clinton as governor that the anti-masonic craze swept the State and largely influenced national politics by the disappearance of William Morgan from Canada, 12 Sept. 1826. On 4 July 1827, by legislative enactment, slavery was abolished. Governor DeWitt Clinton died suddenly at Albany on 11 Feb. 1828 and his successor, Martin Van Buren, resigned in order to become secretary of state in the cabinet of President Jackson.

Under the administration of Enos T. Throop, who acted as governor until the regular election in 1830 when he was chosen governor, the manufacture of brick by machinery was begun in New York; the Albany *Evening Journal* was started by Thurlow Weed; the first omnibus was built and used in New York city; the Albany and Schenectady Railway was opened; chloroform was first obtained at Sacket Harbor; the Whig party was formed; the first horse street railway in the world was opened on Fourth Avenue, New York city; and the anti-slavery society of New York was organized. William L. Marcy who succeeded Mr. Throop, resigned his seat as United States Senator upon his election as governor, was a rabid partisan and rigid economist and favored moderate protection to home industry. He advocated internal improvements and after his re-election in 1834 recommended enlargement of the Erie canal and approved the construction of the Black River and Genesee Valley canals. The city of Albany now was recognized next to Washington as the political storm centre of the Union for her reputed "Albany Regency," which for years made and unmade candidates, controlled legislation and ruled the party and the State with arbitrary and at times high-handed methods. Mr. Van Buren was responsible for the breaking up of President Jackson's cabinet by his open recognition of Peggy O'Neil; his rejection by the United States Senate as minister to England by the casting vote of Vice-President Calhoun, would have led to a general dissolution of the Democratic party had it not been for the resolute individuality of President Jackson.

New York suffered with the rest of the country by the panic of 1837, which originally can be traced to the removal of the deposits from the United States Bank in 1833, and by the deluge of "shinplasters," as a consequence of legislative prohibition of bank bills under the denomination of five dollars. The election of President Van Buren was immediately followed by the financial disaster, a calamity which arrayed against the State and national administrations the entire banking and financial institutions of the entire country; that opened the way to the election of William H. Seward, the first Whig governor, in 1838, and two years later of William Henry Harrison on the "Tippecanoe and Tyler too" platform, the first Whig President of the United States. So demoralized were the finances that in 1841 the State was unable to borrow money to pay contractors upon the canals, and in 1842 a law was passed suspending work and providing for the raising of money by taxation. The Erie railway which secured a charter in 1832, which obtained from the legislature in 1836 a loan of $3,000,000 and which by 1840 was completed as far as Goshen, was abandoned, the company made an assignment, and it was not until 1851 that the road was completed. Public works of all character were suspended and discouragement and depression were paramount.

During the next decade through the administrations of Governors Bouck, Silas Wright, Hamilton Fish and Washington Hunt, the anti-rent troubles were a very prominent disturbing factor in the State, and the question of slavery throughout the country began to assume proportions that pointed inevitably to war. The Constitutional Convention of 1846 was held at the height of the demand of popular sentiment for the limitation of the power of the governor and of the legislature and for the extension of the elective franchise. The Convention abolished the court of chancery, limited the power of the legislature over the revenues, stripped the legislature of the power to appoint general administrative officers of the State, and substituted general laws for the organization of business corporations instead of special legislation. In consequence a great impetus was given to the organization of banking, telegraph, insurance and railway companies to conform with the prodigiously expanding institutions of the State.

The split in the Democratic party, owing to the slavery problem, and the rapid growth of the Free Soil movement in New York, decided the election of General Taylor for President in 1848 and the election of Hamilton Fish as governor. The Whig party in turn was torn by dissensions in 1850 when Washington Hunt was elected governor over Horatio Seymour, and two years later when Seymour carried the election, was a natural consequence of the condemnation of the people for the Compromise measures in Congress. The Whig party ceased to exist as a factor after 1852. With the exception of the slight disturbances in the State over temperance legislation, national politics monopolized the attention of politicians until 1857. In the meantime the American party and the Republican party came into existence. The agitations in Kansas and Nebraska, with the reckless threats of the Southern leaders in Congress, opened the eyes of the most sagacious to the possibilities of war between the sections of the country. The panic of 1857 produced a temporary set-back to the rapidly growing prosperity of this State. When Edwin D. Morgan was elected governor in 1858, the most active parties were the Democrats, the Americans, the Abolitionists and the Republicans. Governor Morgan was re-elected in 1860 on the same ticket with Abraham Lincoln, who had defeated New York's favorite Senator, William Henry Seward,

for the nomination for President at the Chicago convention.

On 12 April 1861 Fort Sumter in Charleston Harbor was attacked. On the 15th President Lincoln issued a call for 75,000 volunteers to defend the life of the Union. The Union Defense Committee of New York was organized that evening. Within ten days 7,334 men were on their way to Washington — the first regiment to respond to the call was the 7th New York, Colonel Leffert's. April 16th the legislature created a State board to enlist and equip 30,000 men. Eighty-two companies were accepted in one week. The first volunteer regiment left the State 29 April and the last 12 July. Governor Morgan who had been commissioned major general, was placed in command of a separate military department of the United States constituting the State of New York. During the four years of war, New York furnished 448,850 men, or one sixth of the total. This proportion holds good in the total losses and casualties. For organizing, uniforming, equipping, substituting and transporting troops, the State expended $3,745,554.98; for bounties $50,657,406; for relief $500,773; or in aggregate, all things considered in the way of official outlay on the authority of the State, $57,569,082.56. The sentiment of New York State placed the responsibility for the war upon the Democratic party, although at the outbreak, thousands upon thousands of Democrats who had stood shoulder to shoulder with the political fire-eaters of the South, joined the Republican ranks, a very large proportion obtaining commissions as officers in the army of volunteers which had been hurriedly thrown together. The succession of Union disasters, however, and the declaration of the Emancipation Proclamation by President Lincoln, had created a feeling of distrust, uncertainty and doubt, which led in 1862 to the overthrow of the Republican party and the election of Horatio Seymour as governor over General James S. Wadsworth, an estimable gentleman and valiant soldier. The rebuke administered was not so much in the nature of a protest against the war as it was a protest against the conduct of the war. The success of the Democrats led to a marked decrease in the number of enlistments, which forced the national government to resort to the expedient of drafts. The demagogical utterances of Governor Seymour had led the reckless and lawless throughout the State to believe his hostility to the conduct of the war included protection for them in the commitment of criminal acts. Unprotected by the transfer of its local militia to Pennsylvania after the battle of Gettysburg, New York city was now exposed for several days to mob law in the enforcement of the drafting, unequaled in the history of the country. Governor Seymour directly repaired to the metropolis, began a conciliatory speech by addressing the mob as "my friends," but eventually warned them by proclamation. The insurrection was only subdued by the return of the local military organizations.

Governor Reuben E. Fenton succeeded Governor Seymour in 1864, having been elected on the same ticket which returned Abraham Lincoln to the White House for his second term as President of the Nation. With the return of peace the country was confronted with the difficult problem of assimilating the hundreds of thousands of soldiers who were now seeking employment in civil life and ordinary avocations. One of the first propositions considered by the people during the second term of Governor Fenton, was the agitation for the convention to revise the constitution, which culminated in the Constitutional Convention of 1867 that assembled at Albany on 4 June. The Honorable William A. Wheeler of Malone, afterward vice-president of the United States, was president of the convention which ended its labors on 28 Feb. 1868. The new constitution was adopted in the convention by a strict party vote. It introduced several original propositions. The legislature was reorganized, restrictions were imposed upon the exercise of legislative powers; the veto power of the governor was strengthened; a court of claims was created and the judiciary system was modified. The legislature of 1868 failed to pass an act to submit the proposed constitution to the people; as a result of the general election held in that year, the power of the State was transferred from Republican to Democratic hands. John T. Hoffman of New York was elected governor, largely due, it was claimed at the time, by flagitious debauchery of the ballot boxes in New York city by the Tweed ring which succeeded in carrying the State for the Democratic candidate for President, Horatio Seymour, by 10,000. From this year the vote of the city of New York in State politics was recognized as a powerful factor. Governor Hoffman was called "the veto governor" because of the unprecedented exercise of the veto power. During his four years in office, he vetoed 495 bills, only two of which subsequently became laws. He established the precedent of filing his reason in writing with bills he declined to sign at the end of the legislative session. The Tweed ring during his reign attained the height of its power. For audacity and rapacity the methods of the Tweed ring were unequaled, but it was soon brought to grief through the disclosures of the New York *Times*. In the meantime it had succeeded in re-electing its favorite candidate, John T. Hoffman, who at the close of his office retired to private life. As a consequence of the operations of this ring, two supreme court judges, George G. Barnard and Albert Cardozo and one superior court judge, John H. McCunn, were ordered to be impeached. Barnard was convicted and removed from office; Cardozo resigned and dodged his trial; McCunn was removed and shortly after died of a broken heart. While the exposé of the Tweed ring demoralized the Democrats, the Republicans were more or less torn by the dissensions in their own ranks on national affairs. An agitation for the revision of the constitution had been general throughout the State for several years, had been advocated by Governor Hoffman and was now recommended by Governor Dix, who in his message called attention to the misuse of sinking funds and to the abuse of the appropriations by the legislature for private charities. The State was suffering from the oppressive financial weights that had been imposed by the War of the Rebellion and from the reckless extravagance that had become a part of the body politic. A constitutional commission undertook to curb the expenditures and the squandering of public moneys. Samuel J. Tilden, who defeated General John A. Dix for

governor in 1874, and who had been actively instrumental in prosecuting the Tweed ring, carefully scrutinized the heavy expenditures that had been made on the canals, and advocated rigid retrenchment. The effect of the financial disasters of 1873 had fallen heavily upon the people of the State. In the winter of 1875 canal boatmen, owners and forwarders petitioned the governor for relief, urging a further reduction of tolls. Accordingly on 18 March 1875, the governor sent a special message to the Legislature arraigning the management of the canals. A commission was accordingly appointed to investigate the system. Twelve special reports were made to the governor disclosing a long line of abuses and calling for the prosecution and punishment of recreant public officers.

Lucius Robinson was elected governor in 1876. He followed the patriotic efforts of his predecessor to curb extravagant outlays upon charitable institutions, urged economy in all public expenditures and used the veto power fearlessly. Governor Robinson was defeated in 1879 owing to the defection of Tammany Hall which nominated John Kelly against him. Alonzo B. Cornell, Republican, was the successful candidate. But for several years the Republican party, although successful in the election for President in 1880, was akin to demoralization because of the fierce struggle between the Stalwarts and Half-breeds, consequent upon President Garfield's repudiation of Senators Conkling and Platt in the matter of making Federal appointments in the city and State of New York. The assassination of President Garfield, the accession of Vice-President Arthur, the defeat for governor in 1882 of Charles J. Folger, who had resigned the high office of Chief Justice of the Court of Appeals of the State of New York to become secretary of the treasury under President Arthur, the defeat for nomination to the Presidency of General Arthur, and the election of Grover Cleveland for governor in 1882 and as President in 1884, all resulted from this bitter and unrelenting partisan warfare.

David B. Hill succeeded, as governor, Grover Cleveland who was elected President, and held office from January 1885 to January 1892. During these years the first practical plan for the creation of an Adirondack State Preserve was taken; the Niagara Falls Reservation was created; introduction of electricity in death sentences was established; the State Board of Arbitration was created; the centennial of the inauguration of George Washington was celebrated in New York; the Australian ballot system first introduced by Charles T. Saxton of Wayne County in 1888 was submitted to the governor and vetoed; a big strike of 3,000 train men on the New York Central Railroad occurred.

Governor Hill's successors in the gubernatorial chair were Roswell P. Flower, Levi P. Morton, Frank S. Black, Theodore Roosevelt and Benjamin B. Odell, Jr.

In 1894 very radical modifications were made to the constitution by a convention which assembled in Albany 8 May and adjourned in September. The new constitution was adopted by the people 6 November.

Governor Odell's administration was marked by several radical reforms, especially in the management of the charitable and public institutions of the State; by rigid economy in all public expenditures and by the adoption by the people of a plan in 1903 calling for the expenditure of $101,000,000 for the improvement and enlargement of the Erie Canal.

GOVERNORS OF THE STATE OF NEW YORK.

Name	Party	When elected
George Clinton		1777, 1780, 1783, 1786, 1789, 1792
John Jay		1795, 1798
George Clinton		1801
Morgan Lewis	Dem.-Rep.	1804
Daniel D. Tompkins	"	1807, 1810, 1813, 1816
John Tayler		1817
De Witt Clinton		1817, 1820
Joseph C. Yates		1822
De Witt Clinton		1824, 1826
Nathaniel Pitcher		1826
Martin Van Buren	Democrat	1828
Enos T. Throop	"	1829, 1830
William L. Marcy	"	1832, 1834, 1836
William H. Seward	Whig	1838, 1840
William C. Bouck	Democrat	1842
Silas Wright Jr.	"	1844
John Young	Whig	1846
Hamilton Fish	"	1848
Washington Hunt	"	1850
Horatio Seymour	Democrat	1852
Myron H. Clark	Whig	1854
John A. King	Republican	1856
Edwin D. Morgan	"	1858, 1860
Horatio Seymour	Democrat	1862
Reuben E. Fenton	Republican	1864, 1866
John T. Hoffman	Democrat	1868, 1870
John A. Dix	Republican	1872
Samuel J. Tilden	Democrat	1874
Lucius Robinson	"	1876
Alonzo B. Cornell	Republican	1879
Grover Cleveland	Democrat	1882
David B. Hill	"	1884, 1885, 1888
Roswell P. Flower	"	1891
Levi P. Morton	Republican	1894
Frank S. Black	"	1896
Theodore Roosevelt	"	1898
Benj. B. Odell Jr.	"	1900, 1902

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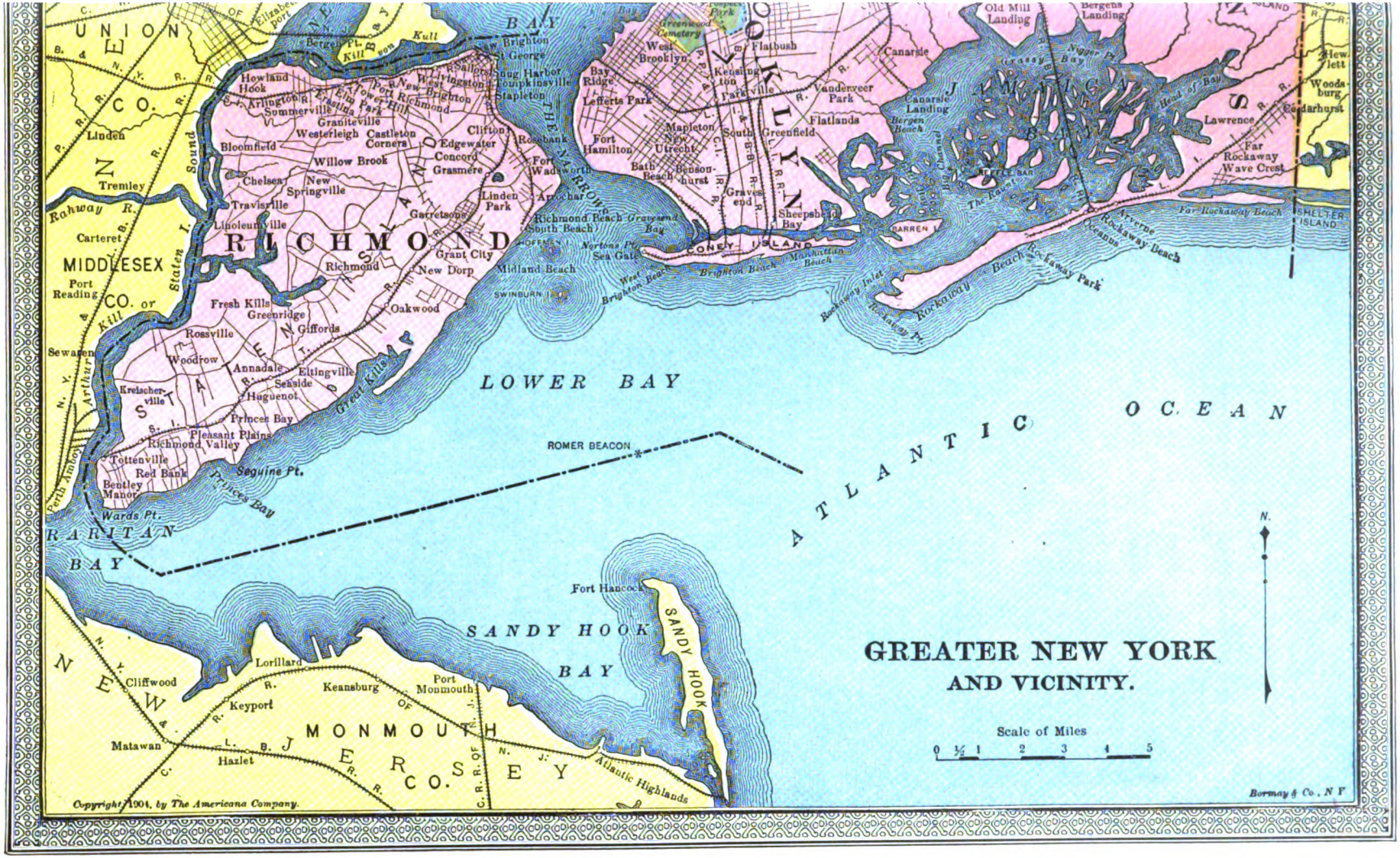
HUGH HASTINGS,
State Historian.

New York, N. Y., first city in the State and in the United States; situated on the shores of the Hudson and North rivers and of Long Island Sound and the Atlantic. The city originally began at the lower end of Manhattan Island, and has spread mainly north and east, having in 1903 an area of 327 square miles. The borough of Manhattan, the business centre of the city, is laid out above 14th Street in rectangular streets and avenues. The chief retail business streets are Broadway, Sixth Avenue, and the Bowery, running north and northwest,


GREATER NEW YORK
AND VICINITY.
Scale of Miles
0 ½ 1 2 3 4 5
N.
LOWER BAY
ATLANTIC OCEAN
SANDY HOOK BAY
RARITAN BAY
RICHMOND
MIDDLESEX CO.
UNION CO.
MONMOUTH CO.
NEW JERSEY
ROMER BEACON
Fort Hancock
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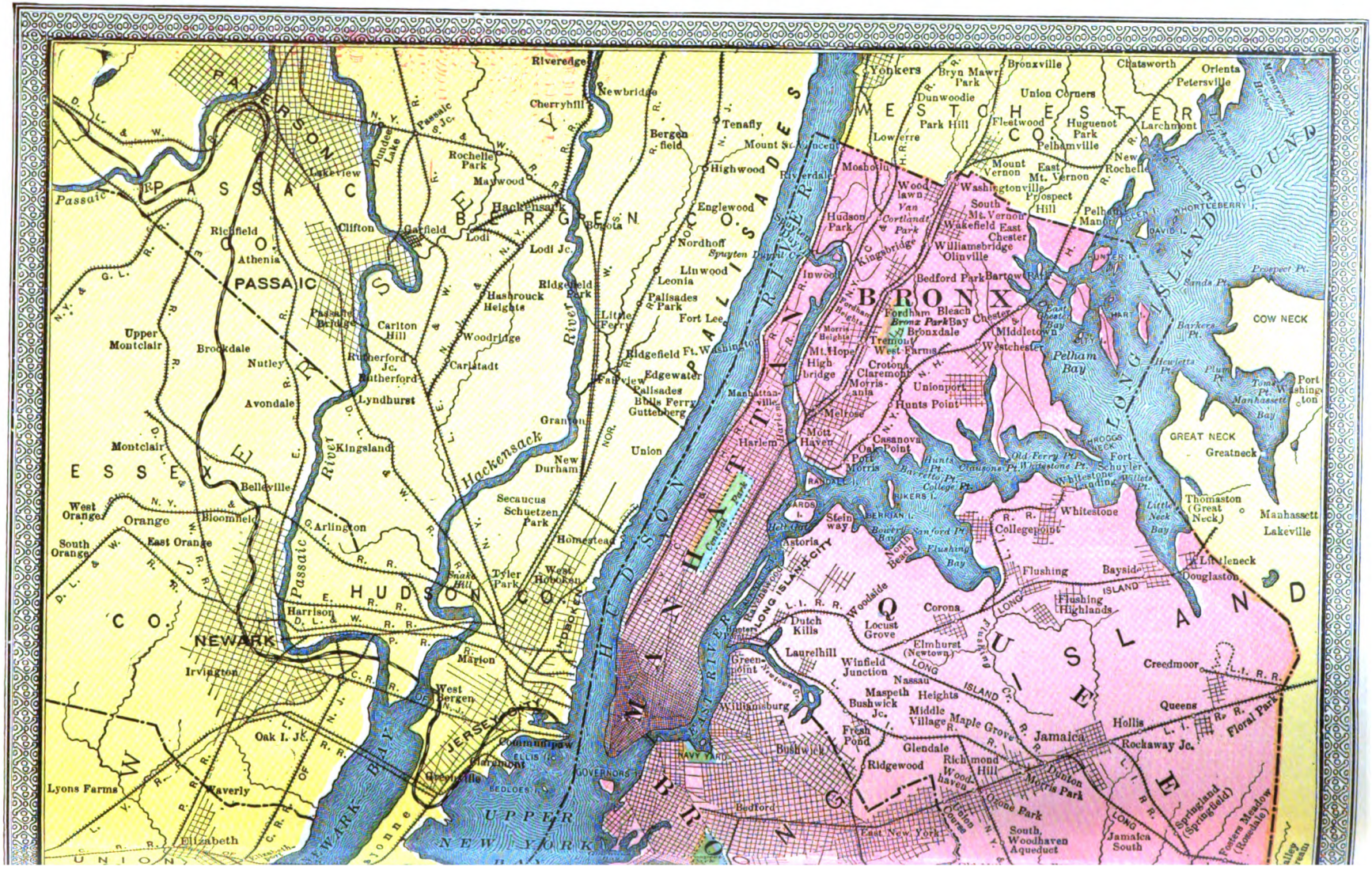
PASSAIC CO.
BERGEN CO.
ESSEX CO.
HUDSON CO.
UNION CO.
WESTCHESTER CO.
BRONX
QUEENS
LONG ISLAND
NEWARK
JERSEY CITY
Passaic River
Hackensack River
Newark Bay
Upper New York Bay
Long Island Sound
Hudson River
Harlem River
Manhattan
Riverdale
Yonkers
Bronxville
Chatsworth
Orienta
Petersville
Bryn Mawr Park
Dunwoodie Park Hill
Union Corners
Fleetwood
Huguenot Park
Pelhamville
Larchmont
Mount Vernon
East Mt. Vernon
Prospect Hill
New Rochelle
Pelham Manor
Pelham Bay
Hunter I.
Davids I.
Whortleberry I.
Prospect Pt.
Sands Pt.
Barkers Pt.
Hewletts Pt.
Plum Pt.
Tons Pt.
Manhassett Bay
Port Washington
COW NECK
GREAT NECK
Greatneck
Thomaston (Great Neck)
Manhassett
Lakeville
Littleneck
Douglaston
Bayside
Whitestone
College Pt.
Fort Schuyler
Whitestone Landing
Old Ferry Pt.
Clauson Pt.
Hunts Pt.
Barretto Pt.
Riker I.
Randall I.
Berrian I.
Wards I.
Steinway
Astoria
Long Island City
Woodside
Corona
Flushing
Flushing Highlands
Creedmoor
Queens
Hollis
Floral Park
Rockaway Jc.
Jamaica
Springfield (Springfield)
Foster Meadow (Rosedale)
South Jamaica
South Woodhaven Aqueduct
Woodhaven
Richmond Hill
Ozone Park
Morris Park
Dunton
Glendale
Ridgewood
Maple Grove
Middle Village
Maspeth
Bushwick Jc.
Fresh Pond
Bushwick
Williamsburg
Greenpoint
Winfield Junction
Nassau
Heights
Laurelhill
Elmhurst (Newtown)
Locust Grove
Dutch Kills
Long Island City
Navy Yard
Governors I.
Bedloes I.
Ellis I.
Liberty I.
Communipaw
Claremont
Greenville
Bedford
East New York
Elizabeth
Irvington
Harrison
Kearny
Arlington
Lyons Farms
Waverly
Oak I. Jc.
West Bergen
Marion
Tyler Park
West Hoboken
Homestead
Secaucus
Schuetzen Park
New Durham
Union
Guttenberg
Bdlls Ferry
Palisades
Edgewater
Ridgefield Ft. Washington
Fort Lee
Little Ferry
Ridgefield Park
Hasbrouck Heights
Woodridge
Carlstadt
Rutherford Jc.
Rutherford
Carlton Hill
Passaic Bridge
Lyndhurst
Kingsland
Belleville
Nutley
Brookdale
Upper Montclair
Montclair
Avondale
West Orange
Orange
Bloomfield
South Orange
East Orange
Athenia
Richfield
Clifton
Garfield
Passaic
Lakeview
Dundee Lake
Rochelle Park
Maywood
Hackensack
Lodi
Lodi Jc.
Bergenfield
Tenafly
Englewood
Nordhoff
Linwood
Leonia
Palisades Park
Cherryhill
Newbridge
Riveredge
Mount St. Vincent
Highwood
Spuyten Duyvil
Riverdale
Inwood
Bedford Park
Fordham
Bronx Park
Bleach Bay
Bronxdale
Tremont
West Farms
Middletown
Westchester
Mt. Hope
High bridge
Crotona
Claremont
Morrisania
Unionport
Hunts Point
Melrose
Mott Haven
Harlem
Casanova
Oak Point
Port Morris
Manhattanville
Washingtonville
Olinville
Williamsbridge
Wakefield
East Chester
South Mt. Vernon
Hudson Park
Kingsbridge
Van Cortlandt Park
Woodlawn
Mosholu
Lowerre
Park Hill
Pelham Bay Park
Bronx Park
Morris Heights
Fordham Heights
Sedgwick Ave.
Jerome Ave.
Lenox Ave.
Lexington Ave.
Madison Ave.
Park Ave.
Fifth Ave.
Broadway
Amsterdam Ave.
Columbus Ave.
Central Park West
Riverside Drive
Riverside Park
Morningside Park
Central Park
Manhattan Bridge
Brooklyn Bridge
Williamsburg Bridge
Queensboro Bridge
Triborough Bridge
Whitestone Bridge
Throgs Neck Bridge
Hell Gate Bridge
Willis Ave. Bridge
Third Ave. Bridge
Macombs Dam Bridge
Alexander Hamilton Bridge
Washington Bridge
Henry Hudson Bridge
Spuyten Duyvil Creek
Harlem River Ship Canal
Newtown Creek
Flushing Bay
Flushing Creek
Flushing River
Bowery Bay
North Beach
Meadow Lake
Corona Park
Jamaica Bay
Rockaway Inlet
Rockaway Beach
Coney Island
Brighton Beach
Sheepshead Bay
Gravesend Bay
Gravesend
Coney Island Creek
Gowanus Bay
Gowanus Canal
Red Hook
Erie Basin
Buttermilk Channel
Governors I.
Bedloes I.
Ellis I.
Liberty I.
Staten I.
Upper New York Bay
Newark Bay
Kill Van Kull
Arthur Kill
Staten Island
Port Richmond
Stapleton
New Brighton
Tompkinsville
Clifton
Port Ivory
Port Richmond
Elm Park
Graniteville
Mariners Harbor
Arlington
Port Richmond
Howland Hook
Elizabethport
Bayonne
Constable Hook
Port Johnson
Port Reading
Perth Amboy
Sewaren
Woodbridge
Carteret
Rahway
Linden
Elizabeth
Elizabethport
Jersey City
Hoboken
Weehawken
Union Hill
North Bergen
Secaucus
Kearny
Harrison
Newark
Irvington
Orange
East Orange
South Orange
West Orange
Montclair
Upper Montclair
Nutley
Belleville
Bloomfield
Glen Ridge
Verona
Cedar Grove
Little Falls
Passaic
Clifton
Paterson
Haledon
Prospect Park
Totowa
Wayne
Pompton Plains
Pompton Lakes
Ringwood
Oakland
Franklin Lakes
Wyckoff
Midland Park
Ramsey
Mahwah
Suffern
Hillburn
Tuxedo
Sloatsburg
Monroe
Harriman
Arden
Turners
Haverstraw
Stony Point
Peekskill
Cortlandt
Verplanck
Buchanan
Croton-on-Hudson
Ossining
Sing Sing
Tarrytown
Irvington
Dobbs Ferry
Hastings-on-Hudson
Yonkers
Mount Vernon
New Rochelle
Pelham
Port Chester
Rye
Harrison
White Plains
Scarsdale
Hartsdale
Greenburgh
Tarrytown
North Tarrytown
Sleepy Hollow
Pocantico Hills
Briarcliff Manor
Pleasantville
Chappaqua
Mount Kisco
Bedford
Katonah
Bedford Hills
Armonk
North Castle
Rye
Port Chester
Greenwich
Stamford
Darien
Noroton
Rowayton
South Norwalk
Norwalk
Westport
Saugatuck
Fairfield
Bridgeport
Stratford
Milford
New Haven
Meriden
Wallingford
Cheshire
Waterbury
Naugatuck
Derby
Ansonia
Shelton
Seymour
Oxford
Southbury
Woodbury
Newtown
Danbury
Bethel
Redding
Ridgefield
Wilton
New Canaan
Stamford
Greenwich
Port Chester
Rye
Harrison
White Plains
Scarsdale
Hartsdale
Greenburgh
Tarrytown
North Tarrytown
Sleepy Hollow
Pocantico Hills
Briarcliff Manor
Pleasantville
Chappaqua
Mount Kisco
Bedford
Katonah
Bedford Hills
Armonk
North Castle

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and 14th, 23d, and 42d streets, running east and west across the island. Each of these thoroughfares is several miles long. Fifth and Madison avenues have been for many years the finest residence streets, but these are now giving way to Riverside and West End avenues, noble thoroughfares overlooking the Hudson and set with large separate mansions. Wall and Broad streets, where centre the financial interests of the city and the nation, are short streets lying east of Broadway and near the southern end of the Island.

Municipal Service and Improvements.— The streets of New York have a total length of 2,534½ miles, of which 1,765 miles are paved; and it costs $5,555,538 to clean and sprinkle them, and $2,730,566 to light them. The total length of the city's sewers is 1,557 miles, and the annual cost of removing the garbage and ashes is $2,511,789. The city supports public free floating baths on the East and North rivers during the summer months. There is also a free interior permanent bath, and five more were in course of erection in 1903. All these things help to keep the city death rate down to 19.06 in 1,000. The city owns its own waterworks, including 1,998 miles of mains, which cost $122,590,000 and have a total capacity of 544,654,000 gallons, one third more than the average daily consumption. The water supply of Manhattan is received from the Croton watershed, 30 miles north of the borough. The police department numbers 7,707 men, with 82 stations, and a harbor patrol steamer; and its annual cost is $11,566,680. The fire department has 2,624 paid and 3,999 volunteer members, and its annual cost is $5,218,300. The street railways of the city, operated mainly by electricity, cover 1,232 miles of line, and represent an outlay for construction and equipment of $250,000,000.

Public Parks and Cemeteries.— The park system of the entire city covers 6,982.4 acres; that of the boroughs of Manhattan, Richmond, and the Bronx 5,406.7 acres. The largest park in Manhattan is Central Park, covering an area of 840 acres, and representing a cost of $15,000,000. It extends from 59th Street to 110th Street. In the southwest corner is the playground and carrousel for children, and beyond the common lawn of 16 acres. The menagerie is in the southeast part. The mall is a broad parade a quarter of a mile long, bordered by double rows of elm trees and famous for its collection of statues. The terrace, a pile of richly carved masonry, and the lake, come next in view, and beyond the lake is the ramble of 36 acres. Farther on is the Belvedere, a tower of stone, and next are the city reservoirs. On the left is the American Museum of Natural History (q.v.). Opposite the Obelisk and near Fifth Avenue and 83d Street is the Metropolitan Museum of Art (q.v.). The largest park in the Bronx is Bronx Park, in the central northern section of the borough. The northwestern section of 250 acres has been assigned to the Botanical Society, whose gardens are free to the public at all times. The southeastern section of the park comprising 261 acres is in charge of the Zoological Society, and its buildings, cages and ranges are free to the public except on Mondays and Thursdays. There are 84 cemeteries in New York and vicinity, the borough of Queens containing more cemeteries than any other section. The number of interments in that borough is 2,500,000, of which 2,000,000 are in the town of Newtown, which has a cemetery area of 1,800 acres. The largest average burial per acre has been reached by Calvary Cemetery — 600,000 in 214 acres, or an average of 2,800 burials to the acre.

Chief Buildings.— First among the buildings of the city devoted to official or public purposes, taking them in the order of their distribution, is the City Aquarium in Battery Park, popularly known as Castle Garden. Originally a fort, this structure later became a public assembly room, and after that for 35 years served as a landing place for immigrants, during which time nearly 10,000,000 immigrants passed through its portals. Since December 1896, it has been used as an aquarium. The new Custom House, now building at the foot of Broadway on the original site of Fort Amsterdam, is to cost $10,000,000. The structure at the corner of Wall and Nassau streets, built by the general government in 1834, was first used as a custom-house, but has been the home since 1863 of the sub-treasury. A handsome building at 65 Liberty Street, the site of which cost $1,000,000, houses the Chamber of Commerce organized 5 May 1768, in Fraunces' Tavern (still standing at Broad and Pearl Streets), and for more than a century the most powerful unit of force in the financial and commercial affairs of the city. A structure of great architectural beauty near the head of Broad Street has been the home since the opening in 1903 of the New York Stock Exchange, which, organized on 17 May 1792, has been for many years the financial centre of the continent. The Post-office building at the lower end of City Hall Park was erected in 1875, and its imposing dimensions bear witness to the wonderful growth of a city whose mail less than 100 years ago was handled by one man. A little to the north of it is the city-hall, completed in 1811, a marble structure of rare beauty and simplicity of design. Cooper Union at the junction of Third and Fourth avenues houses Cooper Institute, founded by Peter Cooper, for "the instruction of the people of the United States in practical science and art." The Institute has an endowment of upward of $2,000,000 and has given instruction to thousands of pupils. Mention must also be made of the Metropolitan Museum of Art in Central Park, which houses the finest art collection in America and has an ample endowment for future purchases; the Metropolitan Opera House, a noble home of the opera with a seating capacity of 3,449; Madison Square Garden (q.v.), one of the most spacious places of public assemblage in the Western World, and finally of the building given in 1900 to New York University for a Hall of Fame of great Americans, a semicircular edifice of granite, which eventually is to contain tablets commemorating all of the Nation's most eminent and honored dead.

Population.— The census of 1900 gave New York a population of 3,437,202, which in 1903 increased to 3,682,159. The area comprised within the present limits of New York city had a population of 49,401 in 1790, which had grown to 696,115 in 1850, an increase of 1,309 per cent. The population of the present city had grown to 2,507,414 in 1890, an increase since 1850 of 260 per cent. Between 1890 and 1900 there was an increase of 929,788, or 37.1 per cent. The

present population is the most remarkable collection of people in the world, the most various in race and religion ever gathered together in such numbers in the history of mankind. In 1900 only 21.5 per cent of the population were native whites of native parentage, and on Manhattan Island only 16.9 per cent or about one sixth. Since the census was taken even these small percentages have diminished, for immigration has been in unprecedentedly great volume, and the birth rate is highest in the districts of the city where the population of alien birth is largest. Even of the native population of native parentage, 737,477 in number, nearly one fifth were born outside of the State of New York. The great feature of the city's population, however, is its immediate foreign derivation. Almost every race on the globe is represented in its population of alien birth, as is shown by the following figures: Germany, 786,435; Ireland, 725,511; Russia, 245,525; Italy, 218,918; England, 155,180; Austria, 113,237; Poland, 53,469; Hungary, 52,430; Scotland, 48,929; Sweden, 44,798; Bohemia, 28,849; Canada (English), 30,550; Canada (French), 5,305; Norway, 18,087; Switzerland, 15,474; Denmark, 9,369; Wales, 4,370; other countries, 58,080—a total of 2,643,957. The Jewish and Italian populations have increased very largely since the above enumeration was made.

Government.— The charter of New York, as revised by the Legislature of 1901, follows, in the main, the lines of the charter of the old city, with important provisions adopted from the charter of the former city of Brooklyn, and from those of other American and European cities. The greater part of it is the law as it has existed for half a century, and the chief changes have to do with the adoption of the borough system and the system of giving control to localities over their own affairs. The executive power is vested in the mayor, the presidents of the boroughs and the heads of the departments. The mayor, who holds office for two years and is eligible for re-election, appoints the heads of departments and commissioners, except those over which the presidents of the boroughs have jurisdiction, and except also the comptroller or head of the department of finance who is elected by the people. He can, with few exceptions, remove any official appointed by him, and can himself be removed by the governor, after a hearing upon charges. The mayor has the power of veto over all ordinances and resolutions of the Board of Aldermen, but an ordinance or resolution can be passed over his veto by a vote of two thirds of the members of that body, except that when it involves the expenditure of money, the creation of a debt or the laying of an assessment, a three fourths vote is required. The president of each borough holds office for two years. He presides over each local board in his borough, with the right to vote on and of veto over its actions, and is an ex-officio member of the board of estimate and apportionment. He is also a member of the Board of Aldermen and has the same right to vote as any member elected to that body. The borough president appoints and may at pleasure remove a commissioner of public works for his borough with control of all matters relating to the improvement and repair of streets and sewers. He also has control of the public buildings in his borough except schools, hospitals, penitentiaries and fire and police stations, and exercises the supervision vested in the city over the construction of buildings in his borough, except such powers as are directly vested in the Tenement House Commission.

Newspapers.— In 1903 there were published in New York 579 regular periodicals: 37 dailies, 222 weeklies; 9 fortnightly, 17 semi-monthly, 272 monthly and 22 quarterly. One third of the books annually published in the United States also bear a New York imprint.

Libraries.— The chief library of the city is the New York Public Library — Astor, Lenox and Tilden Foundations, established in 1895 by consolidation of the Astor and Lenox libraries and the Tilden Trust. The Astor was founded in 1849 by John Jacob Astor, and the Lenox in 1870 by James Lenox. The Tilden Trust was created in 1884 by the will of Samuel J. Tilden, and at the end, by compromise, of a legal contest, became possessed of $1,000,000. The consolidated library has an invested endowment of $4,500,000. It contains 756,000 bound volumes and 220,000 pamphlets, and is eventually to be housed in a building in Bryant Park which will cost $2,800,000. The Carnegie endowment, announced in 1901, provides for 50 branch library buildings which will cost over $3,000,000. Besides the Public Library, there are many institutional, private and special libraries, the chief being that of Columbia University, with 330,000 volumes; others are the library of the New York Historical Society of 100,000 volumes; the Society Library of 100,000 volumes, and the Mercantile Library of 233,000 volumes.

Education and Intellectual Associations.— The city in 1903 had 500 schools, free and wholly supported by taxation at a yearly cost of $23,000,000 — the largest sum spent for public education by any community in the world. This is wholly additional to the amount expended for the sites and the construction of new school houses, the cost of which is met by the issue of city bonds. Five eighths of the annual outlay of $23,000,000 represents the salaries of 13,000 teachers, who give instruction to 535,000 pupils. Evening schools cost $700,000 a year, and vacation schools and play grounds $300,000. First among the city's higher institutions of learning are Columbia University, founded in 1754, with 380 instructors and 4,700 students; the College of the City of New York, established in 1848, with 92 instructors and 2,300 pupils; the New York University, with 212 instructors and 1,900 students; the College of Physicians and Surgeons; the College of St. Francis Xavier, and St. John's College, conducted by the Jesuits; the General Theological Seminary of the Protestant Episcopal Church; Manhattan College; the Conservatory of Music; the New York Law School, the Normal College, and the Union Theological Seminary. A majority of the hospitals have training schools for nurses. There are many art and literary associations, chief among them the New York Historical Society and the National Academy of Design; and, exclusive of Brooklyn, 94 dramatic and musical clubs, 163 social clubs, and 53 music halls and theatres.

Charities.— First among the charitable institutions of the city is the Charity Organization Society, which is supported by voluntary contributions and legacies and serves as a centre of inter-communication between various churches

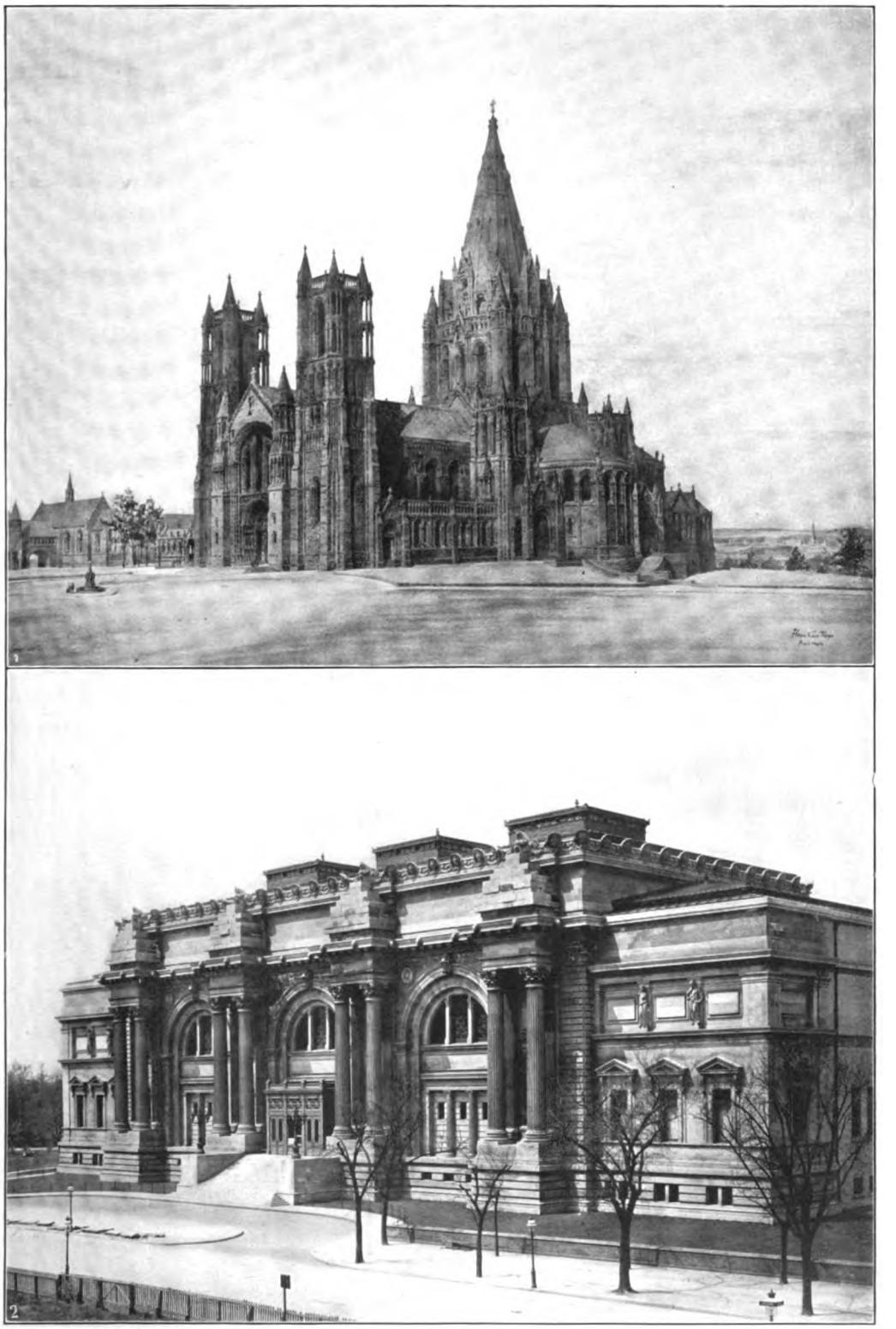


Photo. by Chas. Ballard.

1. Cathedral of St. John the Divine. 2. The Metropolitan Museum of Art.

Mail

and charitable agencies. There are 28 hospitals, refuges and asylums which receive government or official aid, and 98 hospitals and dispensaries supported by voluntary contributions and private endowment. Twenty-nine institutions and associations are conducted for the relief of the aged, and 122 for the relief of children. In the latter class mention should be made of the Children's Aid Society, organized in 1853, which has provided 75,000 boys and girls with homes and places of employment, and in its industrial schools given aid and instruction to over 115,000 children; the New York Foundling Hospital, which is controlled by the Sisters of Charity and contains 4,300 inmates, and the Society for the Prevention of Cruelty to Children, by which an average of 9,000 complaints are yearly received and investigated. There are 26 organized agencies for the reformation of children, fallen women and intemperate men: these include the Catholic Protectory, where 4,500 children are taught trades and industrial employments, and the House of Refuge, where 1,300 boys and girls, received upon commitment of the city courts, are given a common school education and industrial instruction. Noteworthy among agencies for rendering special or temporary relief to the poor are the Grace Institute, endowed by William R. Grace in 1897 to furnish women and girls instruction in trades and occupations and which now has 900 pupils; the Legal Aid Society, which gives free legal aid and assistance to those unable to procure the same; the Prison Association of New York, which aids reformed convicts after discharge; the Provident Loan Society, which loans on pledges of personal property at one per cent a month; the Baron de Hirsch Fund for the benefit of Hebrew immigrants; 15 Church and College Settlement Houses; and the Sailors' Snug Harbor on Staten Island, where a home is provided for 900 aged and decrepit sailors. Mention must also be made of the Society for the Prevention of Cruelty to Animals, founded in 1864 by Henry Bergh, and the parent of similar organizations in many other States and cities.

Churches.—New York is the seat of a Roman Catholic and of an Episcopal archbishop. There are in the city, exclusive of Brooklyn, 151 Roman Catholic, 138 Protestant Episcopal, 86 Presbyterian, 103 Methodist Episcopal, 69 Baptist, 52 Reformed, 68 Lutheran, 18 Congregational, 7 Christian Science, 4 Disciples of Christ, 2 Friends, 7 Moravian, 4 Unitarian, 3 Universalist, 2 Evangelical, and 43 miscellaneous churches and chapels, and 119 Jewish synagogues. The value of church property in the city, exclusive of Brooklyn, is $95,076,000. The finest church building is the Roman Catholic cathedral in Fifth Avenue. Of the others the most notable is Trinity Church in Broadway at the head of Wall Street, which has the longest continuous history of any parish in the city. It was in 1697 that William and Mary granted a parcel of land "in or near to a street without the north gate of the city, commonly called Broadway," for use "as the parish church and church-yard of the parish of Trinity Church within our said city of New York." The church built on this grant was occupied in 1698, and in 200 years has had only nine rectors, each holding the office, on an average, for more than twenty years. Destroyed in the fire of 1776, the church was rebuilt two years later on the original site; but the second building was found to be unsafe in 1839, and in 1846 was replaced by the present structure. In 1705 Queen Anne granted to Trinity the tract of land then known as the Queen's Farm, and lying between the present Fulton and Charlton streets and Broadway and the North River; and this grant, with the growth of the city, had made it the wealthiest parish in America, enabling it to become the generous mother of many children. Saint Paul's in Broadway, built in 1764, and seven other churches and chapels, are all included in Trinity parish and wholly maintained by it. Besides these churches, the parish contributes to the support of many others, and to various missions and hospitals. The income received from what remains to it of the land included in Queen Anne's grant exceeds $500,000 a year, and this splendid revenue is administered in no niggardly spirit. A large part of it is expended on the estate, and upward of a tenth is given to poor churches outside the parish.

Finances and Banking.— The assessed valuation of property within the city for the year 1902 was $3,857,047,718, five sixths of it being real estate. The net bonded debt of the city is $437,796,661. The city expenses are $97,119,031 a year, the tax rate 2.273 per cent, and the city owns property valued at $354,000,000. There are 422 banks of discount (53 national), 49 savings banks, 49 trust companies and 133 building and loan associations. The total stock of the 37 national and 17 state banks which are members of the Clearing House Association is $109,822,700, and their undivided profits $129,257,100 — a total of $239,079,800 actual capital invested in these 46 institutions. The trust companies of New York at the opening of 1903 owned $193,044,837 of stocks and bonds; the state banks, on 23 May 1903 owned $9,720,400, and the national banks (exclusive of bonds held to secure circulation and United States deposits) owned on 9 June 1903, $106,412,100 — a total of more than $300,000,000 in securities owned by the banks and trust companies of the city. Two notable developments in the New York banking world in recent years have been a great increase in bank capitalization leading to the creation of $25,000,000 and $10,000,000 banks, and the establishment of powerful chains of banks and trust companies — that is to say, the close affiliation by ties of common ownership, of a number of large credit institutions, so that it may be said that six or seven such chains now constitute the money power of New York. The largest of the city's savings banks is the Bowery Savings Bank, which at the opening of 1903 had upward of 135,000 accounts open with a total amount deposited of $75,696,854. There are 36 fire and marine, and 5 life insurance companies in the city. The best known of the city's financial institutions is the Stock Exchange, an association for the exchange of securities for currency or its representatives. The securities bought and sold at the New York Stock Exchange are certificates of stock, and bonds issued under national, state, or municipal authority, or by corporations doing business as common carriers, or in banking, mining, manufacturing, or other industrial pursuits. The cash value of the annual transactions in this national monetary institution defies ordinary comprehension. The chief business of its members is buying and selling these stocks and bonds for outside clients,

and so great is the demand for their services that an average of $200,000 a day or $70,000,000 a year is distributed among them in commissions — the charge being one eighth of one per cent on the par value of every transaction. The Stock Exchange is limited to a membership of 1,200, and all new members are now admitted through transfer, "seats" being worth from $65,000 to $75,000. All told, the securities listed on the floor of the Exchange aggregate in round numbers as follows: Railroad stocks, $4,500,000,000; miscellaneous stocks, $3,500,000,000; railroad bonds, $5,000,000,000; miscellaneous bonds, $500,000,000, or a total of $13,500,000,000.

Trade and Commerce.— Nature and man have made New York the main portal of the foreign commerce of the United States. Manhattan Island has over nine miles of docks, but this is not the limit of the city's capacity. Miles of the Hudson River front on the New Jersey side are owned by the great railroad corporations, whose terminals afford docks for the reception of freight and passengers. Across the East River are the docks of sugar refineries, factories, warehouses, government storage houses, and great basins for canal boats, while of late years the shores of Staten Island have been hidden by the growth of docks. The total tonnage of the over-sea vessels entering and leaving the port of New York in 1902 was 17,398,058, only 166,050 tons less than that of London, and if the figures of its coastal are included with those of its deep-sea trade, New York is to-day the leading seaport of the world. Its total import trade is now over $600,000,000 a year, or 55 per cent of the imports of the whole country, and its total export trade $560,000,000, or three fifths of the exports from all the ports of the United States. There are owned in New York 4,000 vessels of all classes, with a total tonnage of 1,247,828. No less than 157 steamship and steamboat lines run from New York to points on the coast, sound, and river, and to ports in Central and South America, Europe, Africa, Asia, and Australia. As to the railroads, it is the terminal of the main line of the Central Railroad of New Jersey, the Pennsylvania, the New York Central, the Erie, the New York, New Haven & Hartford, the West Shore, the Delaware, Lackawanna & Western, the New York, Lake Erie & Western, the Long Island, and the New York, Ontario & Western. The number of passenger trains arriving and leaving the city every week day exceeds 1,000. The New York Central in 1903 projected terminal improvements which will cost $25,000,000, while of even greater importance is the Pennsylvania project of tunneling under the Hudson and East rivers and the boroughs of Manhattan and Queens, giving a continuous track connection between the Pennsylvania and Long Island railroads, with a central station in the borough of Manhattan, and a terminal emergence of the tunnel system at a point near Thompson Avenue, Long Island City. The plans for this improvement, devised by Charles M. Jacobs, call for at least five tubes, each of which will be 18 feet 6 inches inside diameter. Three of these tubes will be 100 feet below high tide under the Hudson River, and two under the East River, each tube holding a single track. The tunnel system will converge at a central station located in a space between Seventh and Tenth avenues, Manhattan. The station structure, designed after the Quai d'Orsay in Paris, but twice as large, will be 1,500 feet in length by 500 feet in width, and will enclose 25 tracks at tunnel level, which will be approached by gradual carriage drive and walk ways. The tunnel tubes will be laid below 31st Street in Manhattan, and underneath Long Island City in Queens. A second central station is contemplated for Brooklyn in East New York. The entire length of the tunnel system will be 15 miles, its cost $50,000,000, and it will be completed before December 1905.

Manufactures.— New York is a great manufacturing as well as trading city. There are at the present time about 440,000 people employed in manufacturing industries in the city, in 39,000 establishments. These establishments represent an invested capital of $840,000,000, and each year pay upward of $210,000,000 in wages. The annual cost of the materials used by them is $570,000,000, and the value of their finished product $1,100,000,000. The principal industries, aside from food, tinsmithing, and mason, carpenter and structural iron work, are the manufacture of sugar, tobacco, and clothing; of brass and copper, chemicals, patent medicines and compounds, clocks, watches, and musical instruments; of rope and cordage, products of iron and steel, boats and sails, glass and glassware, arms and ammunition, india rubber and leather products; of instruments for scientific purposes, gold and silver ware, malt liquors and distilled spirits, paper, oils, paints, pigments and colors, products of cotton, wool, and wood, and of soap, starch, and matches. Mention must also be made of fine printing, lithographing, engraving and map making in which New York holds first place in America. All told the industries conducted in the city number more than 1,000.

History.— The first white men known to have visited Manhattan Island, the future site of New York city, were Giovanni da Verrazano, an Italian sailing in the French service, and Diego Gomez, a Portuguese sailing in the Spanish service, both of whom, while seeking a westerly way to the Indies in 1524, entered what is now the harbor of New York. Nothing, however, in the way of colonization came of their voyage. Eighty-five years later in April 1609 Henry Hudson, an English adventurer in the service of the Dutch East India Company, sailed from Amsterdam as captain of the ship Half Moon, with a charge from his employers to seek a water route to the Indies by the north side of Nova Zembla. Ice early blocked his advance into the Arctic, and so, heading westward, a month's cruise brought him, in July, to the coast of Newfoundland. Thence he sailed southward to the James River, Virginia, and, again altering his course, still in pursuit of a new channel to India, came on 11 Sept. 1609 upon the river which bears his name. He anchored for a time at its mouth and then sailed up the stream until warned by shoaling water that he was at the head of navigation, near the present site of Albany; whereupon he turned his vessel southward, and early in October set out on his homeward voyage. Hudson's account of the stores of fine peltries he had seen in the possession of the Indians moved his employers to prompt action, and in 1609 the former mate of the Half Moon was sent across to trade with the savages and report further upon the country. Handsome profits attended this venture, and in

LOOKING NORTH ON BROAD STREET, NEW YORK.

SHOWING BUILDING OPERATIONS IN MIDDLE DISTANCE.

Mail

1613 the Fortune and the Tiger, commanded respectively by Hendrick Christaensen and Adrian Block, sailed for the Hudson River, being followed within a year by three other vessels from Amsterdam and Hoven. These carried back to Holland such generous cargoes of furs that their owners hastened to open regular communication with the Hudson River country and to establish posts at its head and at its mouth for the purchase and collection of skins while the vessels were on their voyages to and from Holland. The main post, called Fort Nassau, was located just below the site of Albany; but a smaller fort was built on Manhattan Island, its site being just south of the present Bowling Green. Captain Christaensen was appointed head man over both posts, and he and his half dozen comrades were, therefore, the first white settlers on Manhattan Island. Though Christaensen soon lost his life in a quarrel with the Indians, the trade he had helped to found grew and prospered, and soon the merchants who had first engaged in it joined with others in the formation of the United New Netherlands Company, to which, so far as the power lay with the States-General of Holland, was granted for three years from 1615 the monopoly of the fur trade with the newly opened country. This monopoly was renewed for a year at a time until 1621, when the Dutch West India Company came into existence with chartered rights to the exclusive trade of all the coasts of both Americas. The new corporation was, speaking in a broad way, a commercial federation, with branches established in the several cities of Holland. Each branch, though subject to the collective authority of its fellows, was clothed with distinct rights and privileges of its own, and was assigned a specific territory, over which it exercised the right of government and of trade. Thus, the post on Manhattan Island, with its dependent territory, was assigned to the Amsterdam branch, which at once addressed itself to the development of what had now come to be known as the Province of New Netherlands. Accordingly in 1623 thirty families of settlers were sent out from Amsterdam, and a part of them put ashore on Manhattan Island. More colonists arrived in 1625, men who had come as homemakers, and not as transient traders; and to confirm this promise of permanency Peter Minuit was appointed director-general of the colony, with power to organize a provisional government. He arrived at his post in May 1626, at the head of another band of colonists, and having bought Manhattan Island from its Indian owners for a consideration of $24 he proceeded to christen the infant town New Amsterdam. Recalled from his directorship in 1632, Minuit was succeeded in turn by Wouter van Twiller, William Kieft and Peter Stuyvesant. A savage Indian war in Kieft's time well nigh extinguished the colony, but it made rapid recovery under Stuyvesant, who directed its affairs from 1647 to 1664, and by the year last named the hamlet on Manhattan Island has become a town of 1,000 souls, under the government, organized in 1652, of a schout, two burgomasters and five schepens, while thriving settlements had sprung up on both sides of the Hudson and on the lands about the Bay.

The Dutch, however, did not long retain possession of New Netherlands. The English claimed the entire continent as having been discovered by Cabot, and whenever the English and the Dutch were at war New Amsterdam had always to fear the threatened attack of some English squadron. The dreaded blow finally fell in 1664, when Charles II. resolved to seize New Netherlands by surprise. In pursuit of this purpose the king made to his brother James, Duke of York and Albany, a grant which included the whole of the Dutch possessions in America, and late in August 1664 a British squadron appeared before New Amsterdam and demanded its surrender. The coming of the English found the town ill-prepared for a siege, and though Stuyvesant wished to fight, even against heavy odds, he was not allowed to have his way. Articles of capitulation were quickly agreed upon, and on 8 September the flag of the West India Company fell from Fort Amsterdam to be replaced by that of England, and Colonel Richard Nicolls took possession of the town and province in the name of the English king and for the use of the Duke of York.

New Amsterdam was speedily renamed New York, and in June 1665 the city government was reorganized, in accordance with English customs, by replacing the schout, burgomasters, and schepens with a sheriff, aldermen, and mayor. Once again, from 30 July 1673 until 10 Nov. 1674, the Dutch were in possession of the town and province; but the treaty of Westminster finally transferred them from the States-General to England; and the permanent change of ownership was attended by a change of policy which made for the more rapid upbuilding of the town. One important act looking to this end bestowed on New York the sole right to bolt and export flour. The Bolting Act remained in force from 1678 until 1694, and during that time it trebled the population of the town, and gave a prosperous permanency to its foreign commerce. According to the provisions of the act no person outside of the city could grind flour for market or pack breadstuffs in any form for sale. The result of this interdict was to throw the considerable and growing export trade in breadstuffs, mainly with the West Indies, wholly in the hands of the millers and merchants of New York, so that during the sixteen years that the act remained operative the city revenues more than doubled and the total number of buildings in the town increased from 384 to 983, two thirds of which depended in one way or another on the trade in flour, while the port's sailing craft grew from 11 to 85 sloops and ships.

It was while the Bolting Act was still in force that, on 22 April 1686, New York received the charter,—known as the Dongan charter, because granted through the governor of that name,—which still forms the basis of its civic rights. The governor, under this instrument, appointed the mayor and sheriff, but the city was allowed a large quantity of real estate, from some of which it draws a revenue to the present day, while the aldermen were elected by the freeholders of the six wards into which the town had been recently divided, and enacted by laws for its government. The Dongan charter, amended by Queen Anne in 1708, was further enlarged by George II., in 1730, into the Montgomery charter, which, confirmed by the assembly of the province in 1732, made New York virtually a free city. The mayor until the Revolution was appointed by the governor

in council, until 1821 by the governor of the State and four members of the council of appointment, and then for thirteen years by the common council of the city. Since 1834 he has been chosen by the people.

The revolution by which, in April 1689, the crown of England passed from James II. to his daughter and her husband, bred a popular uprising in New York, and control of affairs passed for the time being from the crown officers to a Committee of Safety of ten members, chosen by the citizens. This committee appointed Jacob Leisler, a leading merchant, captain of the fort, and invested him with the power of commander-in-chief until orders should arrive from the new sovereigns. This arrangement was opposed by the so-called Aristocratic party, whose leaders had been office-holders under King James, but without effect, and the government of the town and province remained in the hands of Leisler until March 1691, when Colonel Henry Sloughter, who had been appointed governor of the Colony by William and Mary, arrived in New York. Leisler declined to surrender the fort unless assured immunity for his acts as governor. This was refused by Sloughter, who had fallen under the empire of the Aristocratic party, many of Leisler's followers deserted him, and he was thrown into prison. A little later, with his son-in-law Jacob Milborne and other of his adherents, he was brought to trial charged with treason and murder. All were found guilty by a prejudiced and hostile court, and Leisler and Milborne suffered death on the gallows. Their execution was little less than a judicial murder. Leisler's son afterward secured an order for the restoration of his confiscated estate, and, in 1698, an act was passed by the Parliament of England which canceled the judgments of the court in New York and sustained Leisler's course as governor. Three years afterward the bodies of Leisler and Milborne, denied funeral honors at the time of execution, were taken from their temporary resting place, near the present site of the *Sun* building, and, after lying in state in the City Hall, were with impressive ceremony reinterred in a burial-ground which stood in what is now Exchange Place. No man knows their present sepulture.

The political turmoils of the period did not retard the growth of New York, and the opening of the 18th century found the town's population increased to 5,000 souls,—Dutch and English nearly equal in numbers; a few French, Swedes, and Jews, and about 800 negroes, nearly all of whom were slaves. Slave importation into New York began some time prior to 1628, and reached a climax about 1746, when a census of the town showed 2,400 slaves in a total of less than 12,000 population. Thereafter each year marked a lessening demand for slaves, though they continued to be bought and sold during the entire colonial period. One reason for the decline of slave-holding and slave-buying in New York was the dread of a servile insurrection, dread which led uprisings among the blacks to be punished with unsparing hand. When, in 1712, a party of negroes, forming a wild plot to slay all the whites, met at night in an orchard near Maiden Lane, and killed and wounded a dozen men before being put to flight, 21 of those captured were shot, hung or burned at the stake. Reprisals even more sweeping attended the "Great Negro Plot" of 1741, a panic compounded of fear, rage and suspicion, which has been likened to the witchcraft delusion at Salem Village in 1692. This panic had its origin in a series of fires which in March 1741 alarmed the town, and fixed in the minds of many citizens the belief that they were the work of disaffected slaves.

A short time before the indentured servant-girl of a low tavern-keeper on the North River had been arrested, together with her master and mistress and two negroes, for complicity in a robbery. When a proclamation appeared offering a reward with a full pardon to any conspirator who would tell what he knew about a plot for burning the town, she saw in it a chance to regain her freedom, and "confessed" that her master and mistress, along with sundry blacks and semi-criminal whites, had matured such a plot as the first step in a projected uprising. It has ever since been doubted whether this plot was anything more than a figment of the imagination of a depraved and abandoned girl, but at the moment the creature's charges produced a reign of terror, and scores were jailed and put to death on little save her unsupported statements. Fourteen negroes were burned at the stake, 18 were hanged, and 71 transported, while of the 20 whites thrown into prison four were condemned and put to death. Glutted with victims, the panic finally subsided in September 1741, leaving behind it one of the darkest pages in the history of the city. It would be unjust, however, to judge this affair by the standards of a later time. Fear and terror, fed by fraud, appear to have prompted some awful mistakes, but those who committed them lived and acted under the hair-hung sword. The panic of 1741, moreover, was followed by a wholesome revulsion of popular feeling in favor of the negroes. They were admitted to the franchise within 10 years, and in 1758 the abolition of slavery in New York was practically accomplished by an act which declared that from that time forth all children born of slave parents should be free.

During the first part of the 18th century ocean industries were what mainly contributed to New York's growth and wealth. Kalm, the Swedish traveler, records that 211 vessels entered and 222 vessels cleared from this port in 1730, and the town's river, coast and sea trade grew steadily until the opening of the Revolution, when about one tenth of all the foreign commerce of the colonies was centred at New York. But with the arrival of the British army of occupation, 15 Sept. 1776, a seven years' blight settled over the town. During this period it lost more than half of its population and all of its commerce, and was twice visited by destructive fires. These laid a full fourth part of the town in ashes, nor was any attempt made to repair the devastation until after the British evacuation, 25 Nov. 1783. The war ended, however, the men of New York faced the future with stout hearts. "The town is ruined by the war, but its future greatness is unquestioned," wrote one of them; and in this hopeful spirit was begun the work of building anew—a work pushed with such resolute purpose that within eight years from the town's evacuation its population trebled and its commerce regained and passed its former limit. During this period also it was for a year and a half the capital of the Federal government, and in the Federal

LOOKING WEST ON FORTY-SECOND STREET, NEW YORK.

Hotel Manhattan on the right. One side of the street is torn up for subway construction.

Mail

Hall in Wall Street, on 30 April 1789, Washington was inaugurated first President of the United States.

New York ceased to be the Federal capital in August 1790, but this did not retard its growth, and in 1807, by which time it had reached a population of 60,000, robust faith in its future prompted the appointment of a commission to plot the city south of 155th Street substantially as it exists to-day. The commissioners, however, had hardly begun their task, duly completed in 1811, when New York was made to suffer from the chain of events which led to and attended the second war with England. The act of embargo passed by Congress, in September 1807, dealt what seemed at the moment a mortal blow to the prosperity of the town; and John Lambert, the English traveler, writes that in April of the following year he found 500 vessels in its harbor lying up useless and rotting for want of employment, while the losses of the next six years bore more heavily upon New York than any other city. But with the conclusion of a treaty of peace in December 1814 the town's commerce revived on the instant, and the annual revenues of the port, which had fallen to but little more than $500,000, shot up in 1815 to $14,000,000.

The end of another two years brought the practical inception of an enterprise to which the modern city is largely indebted for its commercial supremacy,— the cutting of a waterway from the Hudson River to the Great Lakes. The Erie Canal, begun on 4 July 1817, and completed on 26 Oct. 1825, made New York the gateway to the commerce of half a continent; and so profoundly did this union of the inland and the outland seas affect its growth that the year 1835 found it a city of 200,000 souls. A fire in December 1835, which caused a money loss of upward of $20,000,000, and the financial panic of 1837, were temporary checks to this growth, but only temporary ones. Gas was introduced into the city in 1825; the first street railway was set afoot in 1831, and in 1851, with the completion of the first trunk line to the Great Lakes, was inaugurated the railway service which has long made New York the seaboard terminus of all east and west lines. This was the Erie, begun in 1836, and extending from Piermont on the Hudson to Dunkirk on Lake Erie. Two years later the second trunk line connecting New York and the West, the New York Central & Hudson River Railroad, was established by the consolidation of a number of shorter lines. Several railroads had been built meanwhile in New Jersey, connecting New York with Philadelphia and other points. These in the process of time became one corporation, as the United Railroads of New Jersey, only to be in turn absorbed by the Pennsylvania Railroad, which after 1854 connected Philadelphia with Pittsburg, thereby not only perfecting New York's connection with the Middle and Southern States, but also sending from the heart of commerce an artery of traffic into the Middle Western States. The building of these and other lines, called, however, for the investment of large sums of money, from which quick returns were expected, and this bred a spirit of speculation whose blighting influence spared no part of the nation. The banks of New York suspended payment from October until December, trade and industry came to a standstill, and there were 5,000 failures, with liabilities exceeding $300,000,000. But confidence returned with the spring, and with it a resumption of railway construction, which, though temporarily retarded by the Civil War, has ever since tended in growing measure to strengthen New York's hold upon the business of the interior of the country. To-day ten trunk lines terminate in New York, which is also the objective point of a major portion of the traffic of all the railroads running east and west.

New York's devotion to the Union during the Civil War found expression in many ways. A sixth of its able-bodied male citizens were in the field before the close of the first year of the struggle, while from the first the women of the city busied themselves with efforts to care for the soldiers in camp and hospital and for their widows and orphans. They led in the founding of the Sanitary and Christian Commissions, and a single fair held in behalf of the former yielded more than $1,000,000. A kindred organization ministered to the necessities of refugees from the South, and a Soldiers' Rest was established on the site of Madison Square Garden, where soldiers could find a temporary home while on their way to and from the front. But in no form did New York's devotion to the Union find more sufficing expression than in the labors of the Union League Club, which, founded in the closing days of 1862 on the basis of "absolute and unqualified loyalty to the government, and unwavering support of its effort for the suppression of the rebellion," counted among its members every loyal citizen of note in the town; $210,000,000 were subscribed by the bankers and capitalists of Manhattan to the loans made by the government between 1861 and 1865, and the major portion of this sum was furnished or secured by members of the Union League Club. There was but one blot on New York's story of splendid loyalty. Proof of the existence of a turbulent element in the population had been furnished in 1849 when some thousands of rioters, taking into their own hands a quarrel between Edwin Forrest and the English actor William Charles Macready, sought to drive the latter from the stage of the Astor Place Opera House, but were held in check by the police, fired into by the militia, and finally dispersed; and the same lawless spirit found expression in an outbreak yet more ferocious in July 1863. Congress had passed a draft law that unwisely exempted from its operation all who should pay into the Federal treasury the sum of $300, and the discontent thus produced was systematically fomented in New York city by pot-house politicians, who in bar-rooms and on street corners declared the draft unconstitutional, and that it bore with peculiar oppressiveness on the poor man. Many vowed resistance, and, borrowing courage from the fact that the city, to beat back Lee's invasion of Pennsylvania, had been denuded of all but 300 troops, made plans to attack the drafting officers. No trouble occurred on the first day of the draft, 11 July, but on the third, 13 July, an organized mob attacked and wrecked the office of the provost-marshal at the corner of Third Avenue and 46th Street. Then the rioters, inspired by animosity toward the negro race, made a raid on a colored orphan asylum in Fifth Avenue, between 43d and 44th streets; and though a handful of policemen aided the nurses in getting the chil-

dren through a rear door to a place of safety, the building was burned to the ground. After this the mob attacked another enrolling office at 1190 Broadway, near 28th Street, with the resultant firing and pillage of most of the shops in the neighborhood. A cry now went up to kill the police, and soon 5,000 rioters, so rapidly had the mob swelled in numbers, were marching down Broadway, bent upon the destruction of police headquarters in Mulberry Street. Thomas C. Acton, president of the police board, informed of the rioters' purpose, detailed Sergeant Daniel Carpenter with 200 men to lie in wait for them. Carpenter marched his squad into Bleecker Street and so to Broadway, at the same time sending detachments up the nearest parallel streets east and west to strike the flanks of the oncoming mob. "Hit for their heads, men," were his orders. "Hit quick and hard, and take no prisoners." The fight that followed came soon to an end, and Broadway was cleared of rioters, save those that lay on the pavement with broken skulls. Routed at one point, however, the mob soon rallied at another, and a few hours later, under cover of darkness, a desperate attempt was made to sack and burn the office of the *Tribune* in Park Row. Here again the police did heroic service, and a charge led by Inspector George W. Dilks at the head of 110 men drove the rioters from the field with heavy loss in killed and wounded. Riotous feints meantime had been made upon the Seventh Avenue and Center Street arsenals and upon the armory at the corner of Second Avenue and 21st Street; the house of George Opdyke, mayor of the city, invaded and some of his furniture destroyed, and an attack made against that of Henry J. Raymond, editor of the *Times*, which had strongly supported the draft. It was clear at the close of Monday that the police force of the city was too small to cope with the lawless spirit. The mayor accordingly called on the State and Federal authorities for aid, and all of the New York regiments at the front were ordered to repair to the city. While this order was in process of execution the mob continued its work of firing and looting houses, and of maltreating and murdering unoffending negroes; but on the evening of Wednesday the returning regiments began to arrive in the city. With their coming, bayonets and bullets were substituted for policemen's clubs, and the rioters were attacked at every point with a resolute desire to do them harm. This wholesome policy, with a temporary suspension of the draft, quelled the rioting, and on Friday 17 July the mayor was able to announce the complete restoration of order. Two millions dollars' worth of property had been destroyed and over 1,200 rioters slain.

New York during the last 40 years has witnessed the assembling of but one mob which the police could not handle without the assistance of the military. That was in July 1871, when the Orange lodges of the city undertook to parade on the anniversary of the Battle of the Boyne. Announcement of their purpose evoked threats of violence from the Catholic Irish, and, fearing trouble, the governor of the State ordered five regiments of the National Guard to escort and protect the procession. Policemen were also detailed to surround and guard it. The point of departure was the corner of Eighth Avenue and 29th Street, and at the appointed hour in the afternoon of 12 July the paraders began their line of march,—a detail of patrolmen in front, then a regiment and next the Orangemen, with a moving wall around them, and two other regiments bringing up the rear. Before they had moved two blocks a volley of sticks and stones from sidewalks, house-tops and windows rained upon Orangemen, police, and soldiery, many of whom were injured. Angered at this treatment, the members of one of the rear regiments, not waiting for orders, fired, some into the crowd and others at house-tops and windows. There was only one discharge, but 54 persons were slain. After this one deadly volley, police clubs and bayonets held some of the rioters at bay, while the greater number turned and ran as the reserve patrolmen along the line hastened to the scene. The remainder of the march passed without incident.

The political history of New York during the first half of the last century was a varied and turbulent one, but with a steady trend toward making the government democratic in all its branches. Until 1834, the mayor, as has been noted elsewhere, was chosen by the State council of appointment or by the common council of the city, which method of selection brought to the office such men as Edward Livingston, DeWitt Clinton, and Philip Hone. After 1834, however, the mayor was elected by the citizens, to whom in the meantime had been granted an unrestricted suffrage. A dozen years later the judiciary was also made elective, and thenceforth most local officers were chosen in the same manner. During this period the Democratic party was the one most often in power. The Federalists, or their successors, the Whigs and Republicans, now and then gained the upper hand; but in the long run the Democrats, under the leadership of Tammany Hall, a secret organization whose social and benevolent aims had been early put aside for political ones, always recovered their hold on the reins. The first mayor chosen by popular suffrage was a Democrat, and so were most of his successors prior to the Civil War. A Republican in 1862 succeeded to the office, but Tammany Hall soon regained control of the municipal government, and for several years political corruption ran riot in the city. Tammany Hall's master spirit at that period was William M. Tweed (q.v.), an able, but coarse and unscrupulous man, who following 1863 organized the politicians of his own party and a number of the local Republican leaders of the baser sort into a gigantic conspiracy to plunder the city. The Tweed Ring, as it was called, attained its greatest power in 1869, when it was master of every department, not only of the city, but also of the State government. Its greatest scheme of robbery was the building of a new court-house in City Hall Park. Work on this structure was begun under a stipulation that the cost should not exceed $250,000, but before 1871 $8,000,000 were expended on it, more than $1,000,000 of this sum being traced to Tweed's pocket. The end came in 1871, when the *Times* exposed the operations of the ring. Then an aroused public sentiment compassed its defeat at the polls, and this was followed by the prosecution and imprisonment of the chief offenders, Tweed himself dying in a felon's cell.

The material prosperity of the city has in-

creased steadily in the last 40 years. A chief factor in the making of the New York of to-day was the construction of the elevated railway system, completed in 1880 through the efforts of Cyrus W. Field. This brought all parts of the island within easy distance of each other, and the unbroken lines of city blocks which quickly followed in its wake wrought a complete transformation in the region in and about Harlem, formerly an isolated suburb reached only by horse-car or steamboat, but now as near the heart of trade as 14th or 42d street was in earlier years. More recently the cable-car and the electric trolley-car have ministered to the increasing need for rapid transportation, and the present year (1904) marks the completion of an underground railway system. The bridge across the East River, completed in 1883, having been found inadequate to the needs of an ever-growing population, a second has been built and two others are being thrown across that stream, while private enterprise is making ready to bind the Jersey shore to Manhattan by driving a tunnel under the North River.

The territorial expansion of New York has the while more than kept pace with its material development. By an act of the legislature passed in 1873, the corporate limits were carried across the Harlem, and a part of Westchester County, amounting to 13,000 acres, erected into city wards. A dozen years later a movement was set on foot to include in one municipality Manhattan Island, Brooklyn, part of Queens County, Staten Island or Richmond County, and yet another portion of Westchester County; and in 1890 a commission of eleven members, headed by Andrew H. Green, was appointed to inquire into and report upon the expediency of the project. The labors of the commission took shape in a bill passed by the legislature in 1894, which provided for the submission of the question to a vote of the people of the cities, towns and villages included in the proposed consolidation. The people gave their vote in November of the same year, and only the residents of Mount Vernon and the town of Westchester failed to record their approval. Meanwhile, by act of the legislature, West Chester, East Chester, Pelham, and Wakefield (or South Mount Vernon), were in June 1895 annexed to New York city, whereby another 20,000 acres were brought within the corporate limits, and Westchester township's vote against consolidation rendered ineffective. This carried the city line to the limit in Westchester County recommended by Commissioner Green and his associates, and in January 1896 a bill was passed by the legislature which made Kings County, a portion of Queens, and all of Richmond integral parts of Greater New York. The same year a commission of nine members was appointed by the governor to frame a charter for the new municipality and report the same to the legislature; and its labors had issue in a bill which on 5 May 1897 received the signature of the governor. This measure, which took effect 1 Jan. 1898, divides the city into five boroughs — Manhattan, the Bronx, Brooklyn, Queens, and Richmond,— embracing an area of a little less than 327 square miles, and counting a population in 1903 of 3,682,159. Thus, fulfilling its imperial destiny, has the village of 250 years ago become the second city in the world. Consult the publications of the New York Historical Society; Wilson, 'Memorial History of the City of New York'; Lamb, 'History of the City of New York.'

RUFUS ROCKWELL WILSON,
Author of 'New York Old and New.'

New York, College of the City of. See COLLEGE OF THE CITY OF NEW YORK, THE.

New York Academy of Sciences, The, was originally incorporated in 1818 under the name «The Lyceum of Natural History in the City of New York.» The title was changed in 1876. There are four classes of members in the association: active, fellows, corresponding and honorary. Annals, memoirs and many pamphlets are published under the auspices of the society.

New York Central and Hudson River Railroad Company, the incorporate name of one of the great transportation systems of the United States. Having its beginning in 1826 as the Mohawk and Hudson Railroad with less than 20 miles of track and an equipment of but a single train, this remarkable railroad system, popularly known as "the Four Track Road," has resulted in the consolidation of over 100 small railroads, and in 1903 it operated as owner or lessee over 3,242 miles of track. In 1903 the New York Central carried 42,437,265 passengers, which required an equipment of 2,118 cars and 547 locomotives. In its transportation of freight during the same year the road employed 63,542 cars and 936 locomotives.

The Beginning.— The growth and development of the New York Central extending over the period from 1826 to 1904 is typical of American commercial progress. The genesis of the great corporation was the Mohawk and Hudson Railroad, chartered in 1826 and opened 12 Sept. 1831. It was the first railroad built in the State of New York. The name was changed a few years later to the Albany and Schenectady. Together with nine other small railroads the Mohawk and Hudson was merged into a corporation, organized under a special law, 2 April 1853, called the New York Central Railroad Company.

The Central.— The ten roads comprising the New York Central were: (1) the Albany and Schenectady; (2) the Schenectady and Troy, chartered in 1836, and opened in 1842; (3) the Utica and Schenectady, chartered in 1833, and opened in 1836; (4) the Mohawk Valley, organized in 1851; (5) the Syracuse and Utica, chartered in 1836, and opened in 1839; (6) the Syracuse and Utica Direct, chartered in 1853; (7) the Rochester and Syracuse, a consolidation of the Auburn and Rochester (1836), and the Auburn and Syracuse (1834); (8) the Buffalo and Rochester, a consolidation of the Tonawanda Railroad (1832) and the Attica and Buffalo (1836); (9) the Rochester, Lockport and Niagara Falls Railroad, organized in 1850; (10) the Buffalo and Lockport, chartered in 1852, and opened in 1854. This consolidation gave the New York Central a continuous line of railway from Albany to Buffalo. The following roads were subsequently leased and then merged into the consolidation: Rochester and Lake Ontario (1855); Buffalo and Niagara Falls (1855); the Lewiston (1855), and the Saratoga and Hudson River (1867).

The Hudson River.— The Hudson River Railroad Company was chartered 12 May 1846. It leased the Troy and Greenbush Railroad, which was chartered in 1845, and in October 1851 opened the new Hudson River line through its entire length from New York city to East Albany. At this stage of the development there were the two consolidated systems, the Hudson River (New York to Albany), and the Central (Albany to Buffalo).

The Consolidation.— On 1 Nov. 1869, the New York Central and Hudson River Railroad Company was organized by the consolidation of the New York Central Railroad Company and the Hudson River Railroad Company. This gave a direct line from New York city to Buffalo. The new company added the following extensive roads to its system: (1) the New York and Harlem, chartered in 1831, and extending from 42d street, New York, to Chatham, included a lease of the New York and Mahopac Railroad from Golden's Bridge to Lake Mahopac. (2) The Spuyten Duyvil and Port Morris Railroad, six miles long, chartered in 1867. (3) The Geneva and Lyons Railroad, from Geneva to Lyons, distance 14 miles. (4) The Syracuse Junction Railroad, a local system. (5) The Buffalo Junction Railroad, between East Buffalo and North Buffalo. (6) The Troy Union Railroad, chartered as a terminal line in 1851, and originally owned by the city of Troy. (7) The two Hudson River bridges, owned by the Hudson River Bridge Company, and crossing the Hudson at Albany and East Albany. (8) The Dunkirk, Allegheny Valley and Pittsburg Railroad, leased until 2373. (9) The West Shore Railroad. (10) The New Jersey Junction Railroad. (11) The Beech Creek Railroad. (12) The Rome, Watertown and Ogdensburg. (13) The Mohawk and Malone Railway. (14) The Carthage and Adirondack Railway. (15) The Gouverneur and Oswegatchie Railroad. (16) The New York and Putnam Railroad. (17) The Pine Creek Railway. (18) The Syracuse, Geneva and Corning Railway. (19) The Fall Brook Railway. (20) The Wallkill Valley Railroad. (21) The Boston and Albany Railroad. Many of these consolidated lines were in themselves great railway systems and are worthy of brief historical sketches.

The Boston and Albany.— On 4 Sept. 1867, the Boston and Albany Railroad Company was formed by the consolidation of the Boston and Worcester Railroad Corporation and the Western Railroad Corporation, and later, 1870, the Boston and Albany Railroad Company consolidated with itself the Albany and West Stockbridge Railroad Company and the Hudson and Boston Railroad Company. Other roads going into the Boston and Albany were the Springfield and North Eastern, the North Brookfield, the Pittsfield and North Adams, the Ware River, the Providence, Webster and Springfield, the Chester and Becket. The entire Boston and Albany system was leased to the N. Y. C. & H. R. R.R. on 15 Nov. 1899 for a term of 99 years.

The West Shore.— The West Shore system was composed of the New York, West Shore and Buffalo and the Syracuse, Ontario and New York, under the name of the West Shore Railroad Company, and was leased to the N. Y. C. & H. R. R.R. Co., 5 Dec. 1885, for 475 years. This lease was ratified by the New Jersey State Legislature.

The Beech Creek.— The Beech Creek Railroad Company was organized 29 June 1886, as the successor of the Beech Creek, Clearfield and Southwestern, chartered 1883, and extending from Williamsport, Pa., to the southern line of Clearfield County, a distance of 100 miles. This was leased to the N. Y. C. & H. R. R.R. on 1 Oct. 1890, for a period of 999 years.

Rome, Watertown and Ogdensburg.— In 1860 the Rome, Watertown and Ogdensburg Railroad was organized by the consolidation of the following roads: Watertown and Rome, Potsdam and Watertown, and subsequently added the Lake Ontario, the Syracuse and Northern, Windsor Beach and Ontario, Rochester and Lake Beach, the Norwood and Montreal, Fulton and Oswego, Syracuse, Phœnix and Oswego, Oswego and Rome, the Utica and Black River, the Clayton and Theresa, the Black River and Morristown, the Ogdensburg and Morristown, and the Carthage, Watertown and Sackett's Harbor. This system was leased to the N. Y. C. & H. R. R.R. on 14 March 1891.

The Mohawk and Malone.— This company was organized in 1892, by the consolidation of the Herkimer, Newport and Poland; the Herkimer, Newport and Poland Extension and the Saint Lawrence and Adirondack. This company's property was leased to the N. Y. C. & H. R. R.R.

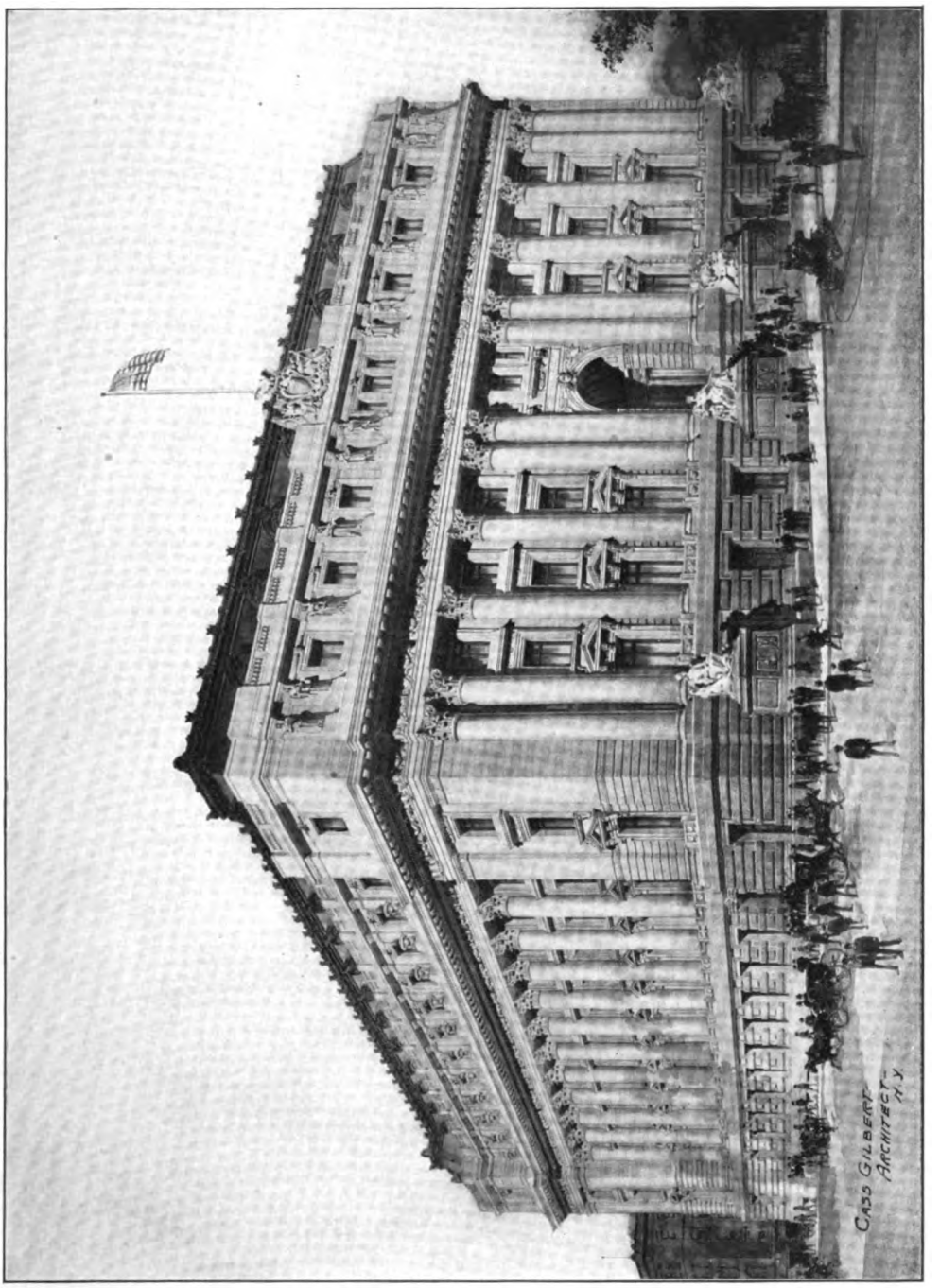
The New York and Putnam.— Organized in 1892, this company represented a merging and consolidation of the New York and Northern; Yonkers Rapid Transit, New York City and Northern; New York, Westchester and Putnam; the West Side and Yonkers and the New York, Boston and Montreal. The system was leased to the N. Y. C. & H. R. RR. on 30 Jan. 1894.

The Fall Brook.— This system included the Blossburg and Corning, the Wellsboro and Lawrenceville and the Cowanesque Valley, and was leased to the N. Y. C. & H. R. R.R. on 11 April 1899, for 999 years.

The Dunkirk, Allegheny Valley and Pittsburg.— Organized 1 Dec. 1872, this system had been the result of a consolidation of the Dunkirk, Warren and Pittsburg, the Warren and Venango and the Conewango Valley. It was leased to the N. Y. C. & H. R. R.R. in 1872 for a period of 501 years.

The Directors.— The directors of the N. Y. C. & H. R. R.R. at its organization in 1869, were Cornelius Vanderbilt, William H. Vanderbilt, Augustus Schell, Horace F. Clark, Daniel Torrance, Chester W. Chapin, James H. Banker, Samuel Barton, Joseph Harker, George J. Whitney, Samuel F. Barger, Wm. A. Kissam, and H. Henry Baxter. Of this original directorate the only survivor in 1903 was Samuel F. Barger. The directors in 1903 were Wm. K. Vanderbilt, Chauncey M. Depew, Frederick W. Vanderbilt, J. Pierpont Morgan, Charles C. Clarke, Wm. Bliss, H. McK. Twombley, Geo. S. Bowdoin, Samuel F. Barger, Wm. Rockefeller, D. O. Mills, W. H. Newman and E. V. W. Rossiter.

The Presidents.— The presidents of the N. Y. C. & H. R. R.R. Company have been Cornelius Vanderbilt, Wm. H. Vanderbilt, James H. Rut-



THE NEW YORK CUSTOM HOUSE.
WHEN COMPLETED TO BE THE FINEST IN THE WORLD.

Uofm

ter, C. M. Depew, Samuel R. Callaway and William H. Newman, in the order named.

Characteristics.— The entire system of the N. Y. C. & H. R. R.R. consisted in 1903 of 1 main line, 2 contract lines, 13 branch lines and 59 leased lines and branches of railroad. It had a total mileage of 3,242.49; has 1,374 steel bridges, 136 stone bridges, 89 wooden bridges, 180 trestles, 33 tunnels, 8 grain elevators, a fleet of 205 barges, ferryboats and other vessels, and employed an army of 50,000 men, to whom $33,000,000 are annually paid in wages. The lines of the company extend through the States of New York, Pennsylvania, New Jersey and Massachusetts.

In 1903, the New York Central owned large proprietary interests (through ownership of stock) amounting to $115,267,134, in the Lake Shore and Michigan Southern, the Michigan Central, the Chesapeake and Ohio, the New York, New Haven and Hartford, and sundry other railroads.

New York Custom-House, in New York, perhaps the most imposing custom-house in the world. It occupies an entire block, irregular in shape, bounded by Bowling Green, Whitehall, State, and Bridge streets. The frontage on Bowling Green is 191 feet; on Whitehall Street and State Street about 288 feet; and on Bridge Street about 278 feet. It has seven stories above the sidewalk and two below, the entire cubical contents being about 8,400,000 cubic feet. Its cost was $4,500,000. The exterior of the building is constructed of Maine granite, is monumental in design, and is richly embellished by carving and sculpture, by the most eminent sculptors in America. The architectural style is that of the Renaissance period. A few public rooms are specially decorated and finished in fine marbles, including the offices of the collector, the main halls, and also the central rotunda. The building is the finest custom-house in the world, both as a structure, and as an office for transaction of customs business.

New York Historical Society, The, an association organized 20 Nov. 1804, for the collection and preservation of historical matter relating to the United States in general and the State of New York in particular. The collections of the society are rare and valuable. In the department of antiquities is the Abbott collection of Egyptian antiques, which is considered one of the finest in the world. The art gallery, which contains nearly 1,000 paintings and 200 portraits, includes the Bryan gallery of old masters, the Durr collection, New York gallery of fine arts, and the works of the American art union. The library has a valuable collection of books, maps, manuscripts and engravings. From 1857 to 1903 the collection was housed in the society's building at 170 Second Avenue, New York. In November 1903 a new home for the society at 77th Street and Central Park West was dedicated and plans made for the removal of the historical treasures owned by the society.

New York Public Library, established 23 May 1895 by a consolidation of the Astor, Lenox and Tilden libraries. Legally this was an amalgamation of three corporations known as the Tilden Trust, the trustees of the Astor Library, and the trustees of the Lenox Library. From these institutions 21 trustees were selected to serve as members of the new corporation. The agreement of consolidation provided for the establishment and maintenance of a free public library and reading room in the city of New York, with such branches as might be deemed advisable for the continued promotion of the objects and purposes of these several corporations. The Astor Library (267,000 volumes) was founded in 1849, by John Jacob Astor, and his endowment was increased, and land and buildings added, by the beneficence of various members of the Astor family. The Lenox Library (86,000 volumes) was founded by James Lenox, who gave land on Fifth Avenue, between 70th and 71st Streets, large funds and valuable collections of Bibles, manuscripts, and Americana. It received subsequently large endowments from his sister, Miss Henrietta Lenox, from Mrs. R. L. Stuart, and others. The Tilden Trust (20,000 volumes), incorporated in 1887, was created by the will of Samuel J. Tilden, made in 1884, which gave his entire residuary estate to trustees to establish and maintain a free library and reading room. A long contest in the courts resulted, before the termination of the suit, in an agreement of compromise by which the Tilden Trust became possessed of over $2,000,000.

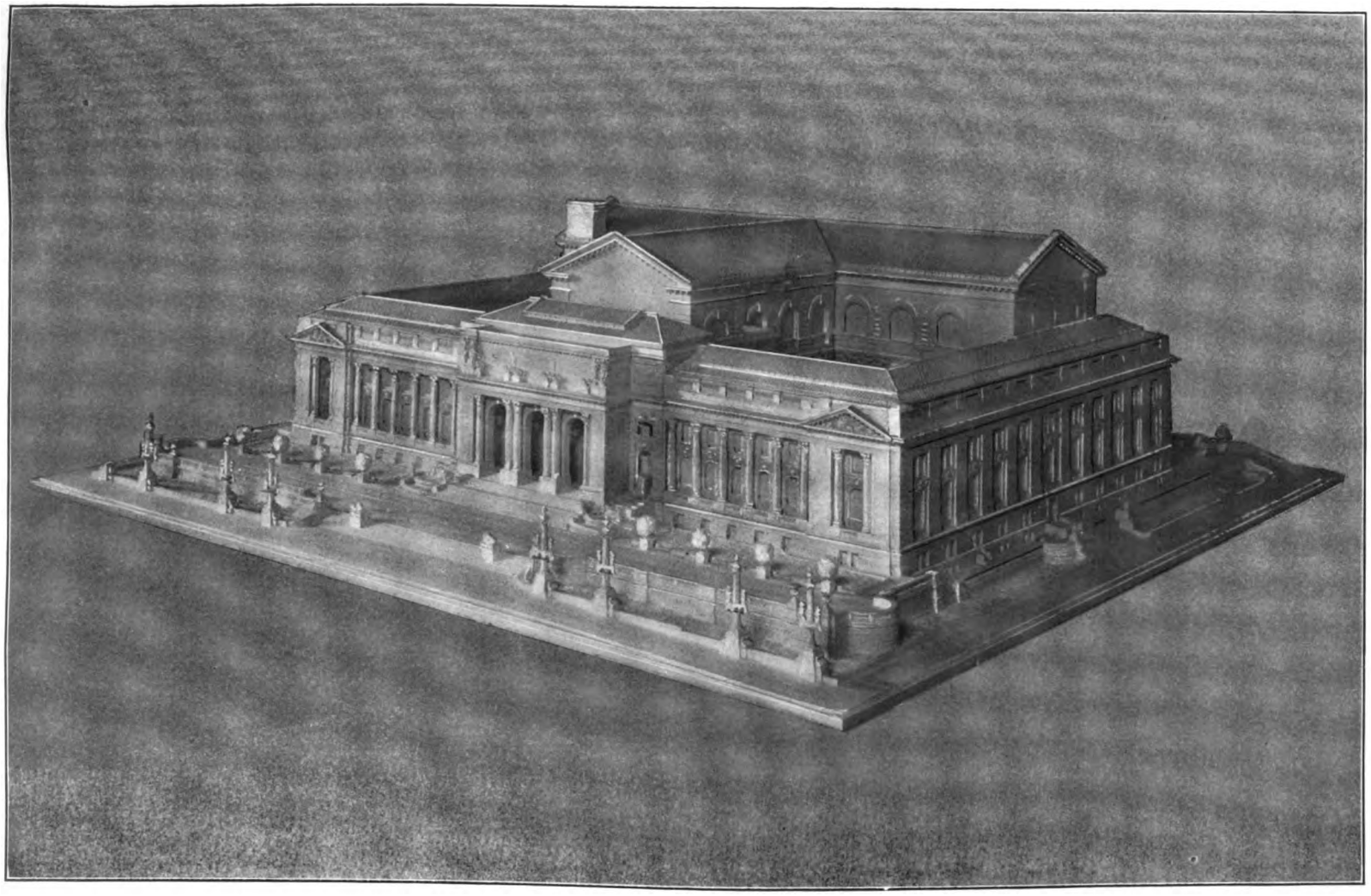
The trustees of the New York Public Library soon after the consolidation in 1885 determined to pursue a liberal policy and to create a great library system not only for the use of scholars, but for the people. The best permanent site for the future great library was considered to be in Bryant Park, on Fifth Avenue, between 40th and 42d Streets, on the site of the city reservoir, which had become obsolete and was practically unused. On 25 March 1896 the trustees made a formal address to the mayor asking aid from the city in securing the site of the reservoir, and in May 1896 the legislature passed a law authorizing the removal of the reservoir and the lease of the land to the library. On 19 May 1897, another act was passed providing for the construction by the city of a library building on the reservoir site, and for its lease to the library, which act was amended in 1900, removing the limit of cost. On 10 November the architects were selected for the new building, and on 1 December the plans were approved by the city. The style of architecture will be Renaissance and the material used will be white marble. The building will front on Fifth Avenue, looking east. The greatest projection of the main façade of the building is 75 feet back of the Fifth Avenue building line. It is intended to make a terrace out of this 75 feet of foreground, serving as a grand approach to the main entrance. The terrace will be 455 feet long. There will be a hallway in the centre of the building 80 feet long and 40 feet wide. The staircases which lead to the second and third floors will be of stone, 12 feet wide. The arches forming the vestibule will be 35 feet high and 15 feet wide. The entrance to the stairs and the elevators will be found on the 40th Street side. On the first floor will be the main exhibition room. On the second floor will be the rooms of the director and trustees, lecture room, and reading room. The top floor will contain the Stuart collection. There will be about 140 feet of ground between the west elevation of the building and the present park. The

design of the building will be monumental in character, with classical proportions. After delays, owing to the inability of the city to appropriate funds for the work, the removal of the reservoir was begun on 6 June 1899. The reservoir has since been removed and the foundation for the new building completed and the cornerstone for the building laid. The Park Department, acting on behalf of the city, entered into a contract with contractors to construct the building at a cost of $2,865,706. In June 1900 the Finance Department of the city requested the library to investigate the condition of the free circulating libraries, and on 24 September a report was made, after careful investigation, recommending a definite centralized system of free circulating libraries. On 11 Dec. 1900 the trustees of the New York Free Circulating Library offered to consolidate with the Public Library, and on 23 Feb. 1901, an agreement of consolidation was effected. An act permitting libraries to deed their properties to the Public Library became a law on 6 March 1901, and under it the Saint Agnes Free Library and the Washington Heights Free Library have conveyed all their property to the Public Library. On 14 Nov. 1900 the library received a communication from the New York Board of Education for the boroughs of Manhattan and the Bronx, recommending co-operation with the public schools, and on 12 December an agreement with the Board of Education was made by which books were to be supplied in 1901, for reading rooms in eight public schools. In 1901 Andrew Carnegie gave to the New York Public Library the sum of $5,200,000, for branch libraries, the city agreeing to furnish 65 sites for such branches.

New York State University. The University of the State of New York is a State department and at the same time a federation of more than 1,900 institutions of secondary and higher education. Its object as defined by law is to encourage and promote education in advance of the common elementary branches; and this is accomplished through an organization embracing high schools, academic departments of union free schools, academies, colleges, universities, professional and technical schools, libraries, museums, study clubs, extension courses and similar agencies. Its government is conducted by 19 elective regents and four ex-officio regents, the governor, lieutenant governor, secretary of state and superintendent of public instruction. The officers of the University are a chancellor and a vice chancellor, who are regents, and a secretary, who administers the department, and has charge of the immediate supervisory work. The regents grant, alter, suspend or revoke charters, confer honorary degrees, appoint boards to examine candidates for admission to the professions, and distribute state funds to secondary schools and free public libraries. They exercise supervision over secondary institutions through a system of preliminary and academic examinations, combined with inspection, and over professional education through their power to admit qualified students to professional schools and state examinations, and license candidates who have met the State tests or otherwise proved their fitness to engage in practice. The annual meeting is held the first Thursday in December, and other meetings as business requires. Since 1892 the regents have held 204 committee meetings and 43 full board meetings, the latter attended by an average of 14 members. In 1903 the appropriations for the department and the schools and libraries to which it apportions money were $661,456.31, including the fund of $350,000 for secondary schools. The University consists of six departments, Administrative, College, High School, Home Education, State Library and State Museum.

In 1754 letters patent were granted to a corporation under the name "Governors of the College of the Province of New York in the City of New York in America." Chapter 51 of the laws of 1784 vested all the rights, privileges and immunities of this corporation (then Columbia College) in the regents of the University of the State of New York, who were thereby "erected into a corporation or body corporate and politic, and enabled to hold, possess and enjoy" these rights, privileges and immunities, together with such other powers as were granted by this act. The original charter of the University authorized the regents "to found schools and colleges in any such part of this State as may seem expedient to them . . . every such school or college being at all times to be deemed a part of the University and as such subject to the control and direction of the said regents." At first the existence of the University was closely associated with that of Columbia College, and the idea of a governing board distinct from all teaching institutions but bringing all into vital relations with the State was attained somewhat later. In 1787 the incorporating act received important modifications, and the regents' powers took the shape which they have ever since possessed. The authorship of the University has been the subject of discussion, generally being ascribed to Alexander Hamilton; but the honor must be shared with James Duane and Ezra L'Hommedieu, as well as other men who took part in the establishment of the institution in 1784 or contributed later to its final organic form. The name regents was naturally adopted for the administering body by men who had the English universities in mind while they were laying the foundation of an educational structure; but the scope of the regents' functions was early determined in an original direction by the needs and freer conditions of education in the American commonwealth.

From the beginning the supervision of courses of education in high schools and academies has been, as it is to-day, the chief function of the regents, the heart of their work, the foundation on which the whole system of higher, professional and technical education rests. In 1784 New York had no system of secondary schools. In 1903 such schools reported 95,096 students and a total net property of $33,771,006.27, with expenditures for the year of $7,106,999.90, property and expenditures being thus divided between high schools and academies: high school property $14,400,278.45, high school expenditures $5,007,055.02; academy property $19,370,727.82, academy expenditures $2,099,944.88. The following table shows the relative growth in academies and academic departments of union schools since 1870:



THE NEW YORK PUBLIC LIBRARY.

FROM THE ARCHITECT'S MODEL.

Mau

	1870	1880	1890	1900	1903
Academic departments ..	62	153	231	565	636
Academies	125	86	104	140	144
Totals	187	239	335	705	780

From 1890 to 1900, while the growth in enrolment in the New York common schools was 16 per cent, the number of secondary school students increased more than 100 per cent. In 1903, 418,230 examination papers, sent in from the schools, were marked in the regents' office.

The regents are charged with the duty of administering the statutes which provide for the general education and special training of professional practitioners. In 1903 they licensed as a result of state examinations, 633 physicians, 176 dentists, 17 veterinary surgeons and 11 certified public accountants. Under exemptions in the professional laws they also licensed 69 physicians, 36 dentists, 6 veterinary surgeons and 3 certified public accountants. The improvement of commercial education and of business schools has been stimulated by their influence and standards. In 1784 Columbia was the only college in New York State. Harvard had been founded in 1636, Yale in 1701, but no serious movement was made in New York in this direction till 1746. In 1903 the universities, colleges and professional and technical schools connected with the university system numbered 118 and reported 39,718 students and a total net property of $86,375,792.30 and expenditures for the year of $10,061,269.25.

The State Library and the associated Home Education department combine a number of educational agencies, including the Library School, traveling libraries and pictures, extension classes and literary clubs. The regents received in 1903 reports from 1,160 public libraries, and State aid to the amount of $21,704.17 was granted to free public libraries, a sum equal to the grant in each case being raised from local sources. The State Library contains 504,525 volumes, 310,340 pamphlets and more than 250,000 manuscripts.

The State Museum, which has developed from the natural history survey undertaken by the State in 1836, comprises departments in geology, mineralogy, palæontology, general zoology, entomology, botany and archæology; and is engaged in pure research and practical scientific experiment. Its collections, representing the investigations pursued under its direction, are extensive and valuable.

The University publishes numerous bulletins in education, history and science, which are widely circulated among students of these subjects.

JAMES RUSSELL PARSONS, JR.
Secretary of the University of the State of New York.

New York University, established in 1830 in New York city. The first steps toward the founding of the university were taken in December 1829, when nine prominent citizens of New York met to discuss the project of establishing an institution of higher learning in the city. Through their efforts the co-operation of various literary and scientific institutions was obtained, a standing committee was organized, and $100,000 subscription raised, most of which was contributed in comparatively small sums. In 1830 the University Council was elected by the subscribers and the university incorporated in 1831. In 1832 the collegiate department was opened for instruction. The ideals of the university were from the first most liberal; the address of the standing committee issued in 1830 stated three fundamental principles which have been consistently adhered to: (1) "The object of the University shall be to extend the benefits of education in greater abundance and variety and at a cheaper rate than at present they are enjoyed"; (2) "Persons of every religious denomination shall be eligible to all offices" that the University may never be under sectarian control; (3) Those attending the University shall pursue studies according to their own preference "having an unlimited choice of the branches taught in the institution."

The present organization of the University includes eight schools, besides the Summer School and the Woman's Law Class. These schools are: the University College (founded 1832), including the College Extension department; the School of Applied Science (1862); the Graduate School (1886); the University Law School (1835); the University and Bellevue Hospital Medical College (founded as the University Medical College in 1841); the School of Pedagogy (1890); the New York American Veterinary College (1899); the School of Commerce, Accounts and Finance (1900). The university senate comprises the deans of the Union Theological Seminary, the General Theological Seminary (New York city) and the Drew, New Brunswick, Catholic, and Jewish theological seminaries. The work of the University College, which had always been largely elective, was in 1894 arranged for the group system; since then the arrangement of groups has been altered, but the principle has been most satisfactory; the groups include the classical, the classical scientific, the Semitic language and literature, political science, philosophy, natural science, exact science, and medical preparatory. The work of the School of Applied Science is arranged on the same principle, the courses include civil, mechanical, marine and chemical engineering. The School of Pedagogy was the first university school to put professional instruction in pedagogy on the same plane with the professional university instruction in law and medicine; it was also the first school to establish degrees in pedagogy; but before its first degree was actually conferred the New York State regents gave the honorary degree of doctor of pedagogy. The Medical College in 1898 was consolidated with the Bellevue Hospital Medical College under its present name; in 1896 this college began requiring a four years' course for all students; this action was in advance of State requirements, as the State law making a four years' course obligatory was not passed till the next year. No university in the eastern States has grown relatively so fast as New York University; within 20 years (1902) the number of students has more than trebled and the value of its property more than quadrupled. The period of its greatest growth has been since 1891, when a site for a new campus was purchased on University Heights, containing about 23 acres. The University College and the School of Applied Science were moved there in 1894, the summer school is located there, and the scientific work of the graduate school is also done there; the other departments, with the exception of the medical and veterinary, are at

Washington Square. Since that time the curriculum has been enlarged, two new schools besides the summer school have been organized, and the number of students steadily increased. The university organization has also been completed, and the various schools closely affiliated under the government of the University Senate. This senate consists of the chancellor, the deans of the various schools, one professor from each of the schools, and advisory members.

Among the buildings on University Heights the most notable is the library building. An adjoining colonnade, with museum below, is known as the Hall of Fame (q.v.). The library emphasizes the seminar rooms, of which there are eighteen, each with its stack room adjoining, the greater number of the books are in these seminar stacks; in 1903 there were 67,364 volumes. The total value of the university plant was over $2,750,000, one of the most valuable educational plants in the United States. The students in 1904 numbered 2,177, the professors 93, and lecturers and instructors 95. The chancellor (1904) since 1891 is Dr. H. M. MacCracken (q.v.).

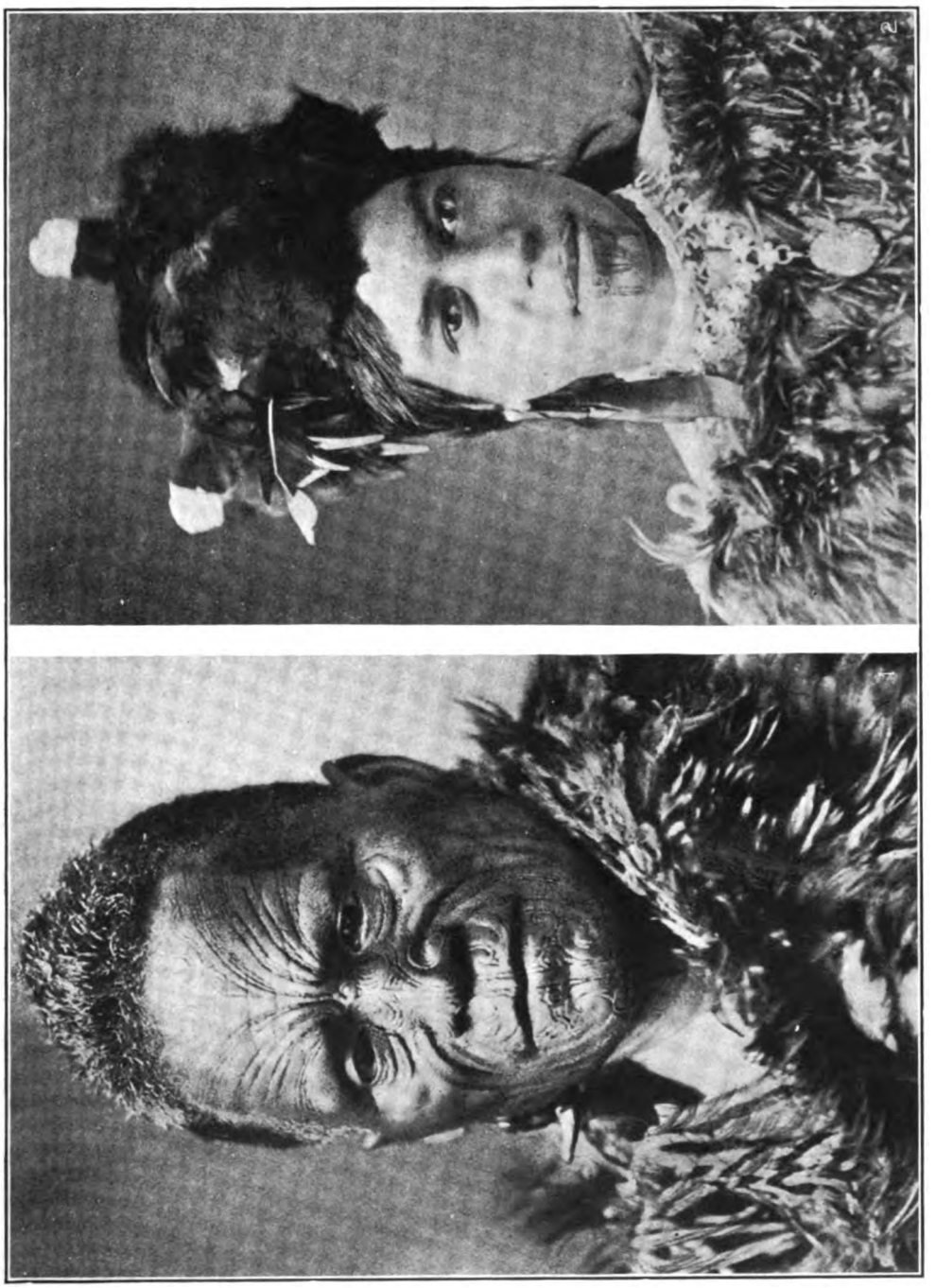
New York Zoological Society, an association having 1,200 members, organized for the establishment of a free zoological park containing collections of North American animals, the study of animal life, and the promotion of zoological science in general.

New Zealand, a colony of Great Britain in the Pacific Ocean, 1,200 miles east of Australia, consisting of two principal islands known as North Island and South or Middle Island, besides Stewart Island south of Middle Island, and several small outlying islands. The group lies between lat. 34° 20′ to 47° 30′ S.; lon. 166° to 178° E. The length of the group, north to south, is about 1,000 miles; the maximum breadth 200 miles; it has a coast line of over 3,000 miles; and an aggregate area of 104,751 square miles. North Island comprises 44,468 square miles, Middle Island 58,525 square miles, Stewart Island 665 square miles, total 103,658 square miles, the rest being divided among Cook and other islands in the Pacific Ocean, since 1901, officially attached to the colony. New Zealand is divided into nine provincial districts, of which four,— Auckland, Taranaki, Wellington and Hawke's Bay, are in North Island, and five — Nelson, Marlborough, Canterbury, Otago, and Westland, in South Island.

Topography.— Cook's Strait, 25 miles wide between its narrowest points, separates North Island from South Island. It is very irregular in shape, and indented by deep bays and projecting headlands. It consists of a main body with projections running east, south, and west, and a long narrow projection 280 miles in length, and tapering from 53 to 8 miles in breadth, which stretches north with a curve in a westerly direction. This remarkable peninsula is nearly cut through by Hauraki Gulf or the Firth of the Thames on the east, and Manukau or Symonds' Harbor on the west; the connecting link being the narrow isthmus on which the town of Auckland is built. Its west coast, with exception of the indentations formed by the harbors of Manukau, Kaipara, and Hokianga, is almost a continuous straight line, whereas the whole of the east coast is a constant succession of bays and promontories, the largest inlets being the Bay of Islands, Wangarei Bay, Wangaruru Harbor, and Doubtless Bay. The main body of the island, as well as its peninsulas, has, for the most part, a rugged and mountainous surface. Besides being traversed from south to north by chains of mountains such as the Te Whaiti, the Kaimanawa, the Ruahine, the Puketoi, and the Tararua range, it presents a number of lofty isolated peaks, among which the most conspicuous are Tongariro and Ruapehu, near the centre of the island, the former 6,500 feet, the latter 9,195 feet high, and Taranaki, near the west coast, 8,280 feet high. Notwithstanding its generally rugged aspect, the mountains of the North Island do not cover more than one tenth of its surface. The streams which descend from the mountains are numerous, but mostly torrents, which bring down immense deposits of shingle. There are, however, two rivers of conspicuous size, the Waikato, with its scenery of great beauty and grandeur. The only other considerable streams are the Manawatu, farther south; the Waiho or Thames, falling into Hauraki Gulf; and the Rangitikei emptying into the Bay of Plenty. Some of the rivers, especially the Wanganui and Manawatu, flow through forest and mountain gorges, amid scenery of great beauty and grandeur. The largest of all the lakes is Taupo, situated near the centre of the island, of an irregular triangular shape, about 25 miles long by 20 miles broad, with an area of about 200 square miles. Northeast from it — in the remarkable region known as the "Hot Lake District," from the numerous hot springs, geysers, and natural warm baths — are Lakes Rotorua, Rotoiti, and Rotomahana. Wairarapa and several other lakes are near the south extremity of the island. In the same locality is one of the most extensive plains of the island, occupying an area of above 600 square miles.

South or *Middle Island* is of a more compact and regular form, and may be considered roughly as a parallelogram, stretching about 500 miles from northeast to southwest, with a medium breadth of about 130 miles. In the north, where it is separated from North Island by Cook's Strait, it is very rugged and broken, and corresponds so closely with the opposite coast, both in its general structure and the direction of its headlands and submerged reefs, as to give good ground for the opinion that the two islands were at one time continuous. In the southwest, too, the high mountainous country is broken into by long winding fiords or sounds; but with these exceptions, and a remarkable spur on the east coast called Banks' Peninsula, the coast-line on the whole is continuous. The chief indentations in the north are Tasman or Blind Bay and Massacre or Golden Bay; on the east are Cloudy Bay and Pegasus Bay; in the south and southwest are Preservation Inlet, Caswell, George, Dusky, and Milford Sounds. The interior is traversed north to south by a lofty mountain chain, which is evidently a continuation of that which terminates on the opposite coast of the northern island. This chain has an average height of about 8,000 feet; but Mount Cook, in lat. 43° 30′ S., has two peaks, the one 12,200 feet and the other 13,200 feet high, in the midst of magnificent alpine and glacier scenery. Here

NEW ZEALAND — NATIVE TYPES.



MAORI KING AND QUEEN — WAITAKA TRIBE.

Mau

this mountain range runs nearer to the west coast; and between it and the east coast lies the great Canterbury Plain, more than 120 miles in length, and rising toward the south into the undulating downs of North Otago. Numerous rivers flow down from the mountains to the sea on both sides, the longest on the east. The largest river is the Clutha, which has a course of 150 miles, and enters the sea near the south-east angle of the island. There are a number of lakes, generally situated among the mountains at a considerable elevation. The largest are Te Anau, area 132 square miles; and Wakatipu, area 114 square miles. The scenery of the lakes and sounds of this island attracts numerous visitors.

Stewart Island, separated from South Island by Foveaux Strait, about 15 miles wide, and is of triangular form. Its shores are wooded to the water's edge, while numerous bays, separated by rocky headlands, indent the coast, which is fringed, more especially toward the south, with numerous islands. The interior is mountainous, but none of the summits exceed 3,200 feet.

Of islands lying round the New Zealand coast the largest are Great Barrier Island, at the outer entrance to the Hauraki Gulf, and D'Urville Island at the corner of Tasman Bay. The following more distant groups also belong to the colony:— Chatham Islands, Auckland Islands, Campbell Islands, Bounty Islands and Antipodes Islands. The British resident in the Harvey, or Cook, group is appointed on the recommendation of the New Zealand government.

Geology and Mineralogy.— To the geologist the two large islands are a continuity, and form the remnant of a continent which once extended eastward and was probably connected with South America. A great leading range of Palæozoic rocks stretches through both islands, branching out in the south to enclose the extensive schistose area of Central Otago. Upper Mesozoic formations have also enormous development; and in the North Island their outcrops are distinguishable through the volcanic deposits which cover a good part of the surface. In this island are also extensive areas of hydrothermal agency, marking the expiring activity of volcanic outbursts. So late as 1886 there was a violent eruption of Mount Tarawera in the Hot Lake District, during which the celebrated Pink and White Terraces of world-wide fame as natural wonders, disappeared; it was previously supposed to be an extinct volcano; Mount Tongariro and Ngaruhoe, in the heart of the island, also are still active. Sedimentary rocks, chiefly of gray sandstone, are often seen, both among the ridges of the interior, and on the coast, where they frequently form precipitous cliffs; but the far greater part of the rocks are crystalline. Among a great variety of fossils the most notable are those of a gigantic bird, the Moa (*Dinornis giganteus*), which survived down to recent times. New Zealand is extremely rich in mineral deposits, and gold-mining forms one of its staple industries. Gold was first discovered in 1853, and the total value of the output to 31 March 1901, was over $289,000,000. The output in 1902 was 508,043 ounces, valued at $9,496,634. The great gold-producing regions are the Thames district of Auckland, the west coast of the South Island, and the interior of Otago. During the last few years the method of raising gold by dredging the beds of rivers has developed to a remarkable extent. In 1900 326,457 ounces of silver were exported. The extensive coal-measures are also a source of wealth. Among many varieties the best is the bituminous coal of the west coast of the South Island, which is equal in quality to that found in any part of the world. The output has been steadily increasing, and for 1900 amounted to 1,093,990 tons. Copper, chrome ore, manganese ore, sulphur, and other minerals have been worked with varying success. Working miners make good wages, and there is a good deal of independent prospecting. Mining schools have been established in different parts of the colony, and the study of mineralogy is pursued with considerable zeal.

Climate.—In a country stretching through 13 degrees of latitude the climate naturally is very varied, but generally is very healthful. In the northern peninsula of North Island the conditions are semi-tropical, while in the high lands of Otago and Southland the frosts in winter are very severe, and the summer bracing and temperate. In Wellington, which may be taken as the centre of the colony, the temperature scarcely ever falls more than one or two degrees below freezing point; while in Auckland, the most northerly of the large cities, the heat is tempered by sea-breezes, and never reaches the intensity which makes life in summer so trying in the great Australian cities. Rapid changes of temperature are caused by sudden shiftings of wind, and are somewhat trying to new arrivals in the country. The greatest rainfall is along the west coast of the South Island, where it sometimes reaches 130 inches a year; whereas a characteristic station on the Canterbury Plains will seldom give more than 25 inches.

Ethnology.— The original natives of New Zealand are called Maoris. Ethnologists differ regarding their origin, but many class them as Caucasians. Their arrival in New Zealand was probably part of a series of Polynesian migrations from west to east, and took place, according to their own tradition, about five hundred years ago. Before the European occupation the life of the Maoris was occupied with incessant tribal warfare, and victory was followed by cannibalism. Both of these have disappeared; but in districts far removed from white settlement they preserve many of their ancient habits. In their own villages they are kindly and hospitable, but dirty. Much is being done through organized efforts for the education and Christianization of the Maoris. They have native schools and one native college, and some of their students have obtained distinction in the New Zealand University. They possess a good deal of land, especially in the North Island, and have their own representatives in both legislative chambers. The census returns for some time showed a steady decline in their numbers, but this has now been checked. Lung diseases, fever, and scrofula are said to be the chief enemies of the race, but much has been done to improve their sanitary conditions and personal habits.

Flora, Fauna, etc.— Among vegetable productions the most characteristic are the ferns (130

different species), which form almost the only vegetation over immense districts. Some of them are more than 30 feet high, and remarkable for the elegance of their forms. The flax plant furnishes an article of export. A number of the forest trees furnish valuable timber, among them the rare kauri or damar pine. Flowering plants are remarkably scarce, and there are no indigenous fruits.

In animals New Zealand is singularly deficient, only a sort of fox-dog, now extinct like the moa, a rat, and two species of bats, being indigenous. Rabbits have been introduced and have multiplied so as to become a perfect pest; pigs now run wild, as well as cats. Pheasants, partridges, quails, and red and fallow deer have also been successfully introduced. All the common European quadrupeds appear to be easily acclimated. Pigeons and parrots are the most common native birds. Among others are the apteryx (a wingless bird), the huia or parson-bird, and the owl-parrot. The chief reptiles are a few lizards. The coast waters teem with fish, and seals are still numerous in some parts.

Land Tenure, etc.— Since 1840 the crown has been gradually acquiring by purchase the land of the natives in the North Island, and in 1899 it was estimated that 13,500,000 acres had become crown estate. Most of the crown lands are now disposed of for terms of 999 years at a 4 per cent rental on the capital value. Other modes of tenure are: cash purchase, one fourth of the purchase money being paid down at once, the remainder within 30 days; lease for 25 years, with a purchasing clause at a 5 per cent rental on the values. The amount of land that can be acquired by any individual is limited to 640 acres of first-class, and 2,000 acres of second-class, land. Provision is also made for "small-farm associations," under which any twelve persons may, with the approval of the minister of lands, select a block of not more than 11,000 acres. A scheme for "village settlements" in 1885 has had considerable success.

Agriculture.— The soil and climate of New Zealand produce in perfection every European grain, grass, fruit, and vegetable, and many besides. Wheat, oats, barley, potatoes, onions, apples, plums, peaches, and their congeners, are excellent in quality, and the peach bears profusely as a standard. In the gardens of the warmer valleys fruits of a semi-tropical character — the pomegranate, citron, orange, and olive — might be raised. The vine thrives well under glass. Maize, the taro, a native of the Sandwich Islands, and the kumera, a sweet-potato, are partially cultivated by the natives in sheltered sunny spots of the North Island; but under common field cultivation maize will not ripen. Geraniums and myrtles, attaining a shrub size, and various plants which require the greenhouse in England, flourish through the winter in the open air. New Zealand is primarily a pastoral, and secondarily an agricultural, country. Of the 12,500,000 acres of land under cultivation about 87 per cent is under sown grasses, 6½ per cent under root and green crops, the remainder being occupied by garden and orchard cultivation. The fluctuations in the price of produce cause considerable variation in the extent of land laid under crop from year to year; but new land is broken in every year. The number of sheep in the colony was, in 1861, 2,761,383, in 1891, 18,227,186, and in 1902, 20,233,099. The increase in horses, horned cattle and swine is in about the same proportion.

Industries and Commerce.— Agriculture and stock-raising are the most important resources, and mining is also an important occupation, as already pointed out in the paragraphs on agriculture, geology and mineral resources. In connection with these industries there were in 1900, 3,163 supplemental establishments for meat freezing, preserving, and boiling down, tanning, wool-scouring, the production of clothing and boots, saw mills, grain mills, butter and cheese factories, iron and brass works, employing 41,726 work people, with an invested capital of about $40,000,000, and an annual estimated produce of about $85,000,000. By far the most important export is wool, about $20,000,000 annually; frozen meat and grain are also largely exported. Gold is the next valuable export; others are tallow, timber, and kauri gum. In 1901 the exports amounted to $63,452,300, the imports to $59,089,575.

Railways, etc.—In 1901, there were 2,300 miles of railway in New Zealand open for traffic. Almost the whole of this has been constructed by government, which up to the period mentioned had expended $86,000,000 on the construction of railways. Several hundred additional miles are in course of construction or projected, chiefly in South Island. There is a system of telegraphs belonging to the government with 7,249 miles of line in 1901. Roads are being opened up in all directions, either under the central department or the local bodies, and the administrative ownership of all public utilities such as railways, telegraphs, telephones, street car lines, water, gas, and electric plants, is a socialistic feature in the political economy of New Zealand, that is attracting considerable attention from older communities. The principal ports of New Zealand are: In North Island, Auckland, Napier, New Plymouth, and Wellington; in South Island, Port Chalmers, the port of Dunedin, Nelson, Lyttleton, the port of Christchurch, and Invercargill. The principal towns are Auckland, Christchurch, Dunedin, and Wellington, the last being the seat of government.

Government.— By the constitution the king appoints the governor; but the legislative power is vested in the General Assembly, or Parliament of two houses — a Legislative Council consisting of 48 members nominated by the crown for life; and a House of Representatives, which is made up of 74 members, including 4 Maoris, elected by the people for three years. The governor is aided and advised by a ministry comprising the chief officers of state, who are members of the General Assembly. By the act passed by the assembly in 1875, which abolished the provincial system, the powers previously exercised by superintendents and provincial officers were delegated to 83 county councils, or vested in the governor.

Woman suffrage; administrative ownership of public utilities; old-age pensions; appointments for life in the civil service, with provision for support in old age; post-office savings banks; the loaning of money by the state on mortgages; a government life insurance company; a public trust office for administering and settling estates; taxation on a progressive scale, by which

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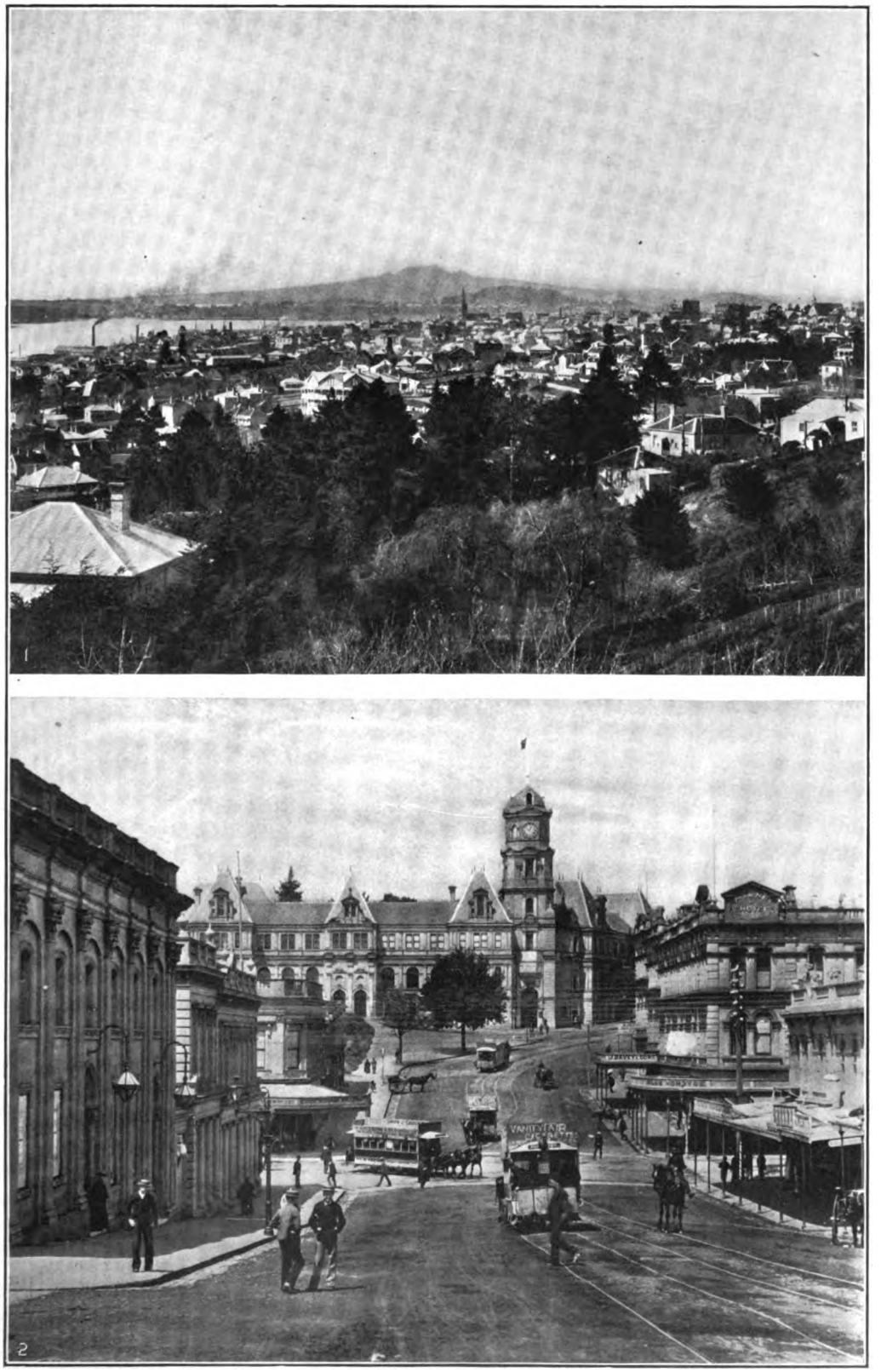

1. View of Auckland, from Ponsonby.
2. Art Gallery, Public Library, and Municipal Buildings, Auckland.

Mau

nearly the entire burden falls upon the rich; the compulsory division of large estates into small holdings; compulsory arbitration in the case of labor disputes, with power to fix the minimum wage, form a partial list of the innovations now sanctioned by law in New Zealand. The civil and criminal laws are the same as those of England. For colonial defense a number of volunteers have been enrolled (about 8,500); the chief ports are also being put in a state of defense.

Religion and Education.—There is no state-aided Church, but most Christian sects are well provided for. The Church of England is most numerously represented. Elementary education is free, secular, and compulsory. Secondary education is provided for in numerous high schools, grammar schools, colleges, etc. At the head of the higher education is the University of New Zealand, an examining body empowered to grant honors, degrees, and scholarships. Affiliated with it are several colleges throughout the colony. There is also a separate university at Dunedin. There are training colleges for teachers, theological colleges, etc.

Population.— In 1901 the population of North Island was 390,751; of Middle Island, 381,661; of Stewart Island, 272; of Chatham Islands, 207, and of Kermadec Islands, 8; total, 815,862, including 43,143 Maoris, and 2,857 Chinese, the bulk, 98.50 per cent, being British subjects, born in New Zealand, or immigrants from the United Kingdom.

History.— New Zealand was discovered by Tasman, the Dutch navigator, in 1642, but information concerning the country commences with the visits of Captain Cook, made in 1769, 1773, 1774, and 1777. Missionaries and whalers were the chief visitors until 1823, when a British resident was appointed to the settlement of Kororareka, now Russell, in the Bay of Islands. In 1840, by the Treaty of Waitangi, the native chiefs, to the number of five or six hundred, ceded sovereign rights to the queen, while retaining territorial rights for themselves and their tribes. Casual differences culminated at last in a war which lasted from 1860 to 1866, caused widespread distress, and retarded progress and settlement for ten years. The war was confined to the North Island, and to the districts of Auckland, Taranaki, and Hawke's Bay. Many of the tribes remained friendly, and used their influence to protect the settlers; and on the whole the Maoris showed themselves brave and high-minded foes. The new settlement recovered slowly from the devastating effects of the war, and since then there has been no serious interruption, beyond ordinary economic fluctuations, of the expansion of the country in trade and agriculture. Successive administrations have employed their energies in promoting land settlement and in legislating for the social and commercial needs of a growing people. The history of the country was entirely internal until the war between England and the South African Republics, 1899–1900, when a force of about 1,700 mounted men was despatched to the aid of the mother country. New Zealand has, up to the present (1904), declined to join the Federation of the Australian Colonies.

Consult: Bradshaw, 'New Zealand of To-Day' (1888); Gisborne, 'The Colony of New Zealand' (1891); Lloyd, 'Newest England' (1901); Loughman, 'New Zealand' (1901).

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New Zealand Flax. See FIBRE.

New Zealand Sub-region, a faunistic division by some naturalists included as a subregion under the Australian region, and by others regarded as so distinct as to be entitled to a place of the first rank. It includes besides New Zealand neighboring islands southward and eastward. See ZOOGEOGRAPHY.

Newark, nū'ark, Del., town, in Newcastle County; on the Philadelphia, B. & W., and the Baltimore & O. R.R.'s; about 11 miles south of Wilmington. It is in a section of the State noted for its productiveness. The chief manufactures are paper, machinery, fibre, and canned goods. There is considerable trade in the manufactured articles, fruit, and vegetables. It is the seat of the State College, opened in 1833. The town owns and operates the electric-light plant and the waterworks. Pop. (1890) 1,191; (1900) 1,213.

Newark, N. J., city, county-seat of Essex County, and the metropolis of New Jersey, is situated in latitude 40° 45′ N., longitude 74° 10′ W. It is one of several cities in New Jersey within the direct zone of influence of Greater New York.

History.— Immediately following the English conquest of the New Netherlands in 1664, a part of the Dutch possessions in North America, being practically what is now the State of New Jersey, was granted to Lord John Berkeley and Sir George Carteret. The settlement of northeastern New Jersey was immediately begun under a liberal form of government; a site near the mouth of the Passaic River proving attractive to certain Congregationalists, then settled in the Colony of Connecticut. In May 1666, the New Englanders removed "their families, their beloved pastor, their church records, and communion service, their deacons, and their household goods" to the site of the future city of Newark. By 1685, Newark, in which the Congregationalists had settled, was a compact town of 500 inhabitants. The system of local government was like that of many early New England villages, being the limitation of political and religious activity, through the agency of the town meeting, to those who professed Congregationalism.

The strong element of conservatism, characteristic of the settlement of Newark, remained unchanged until long after the opening of the 19th century. Religion and education were warmly supported, and for several years the College of New Jersey, now Princeton University, was located at Newark. The tidal waters of the Passaic River gave easy access to New York, the country-side supplying provisions and wood to the inhabitants of Manhattan island. Newark was also engaged in a coastwise trade. To a degree the young community was somewhat isolated owing to the difficulty of road-building over the marshes and the ridge of rocks separating Newark from Paulus Hook, now Jersey City.

In the Revolutionary struggle, Newark took an active part. As early as June 1774, her in-

habitants protested against the Port Bill, and offered to become parties to a plan of union to redress grievances. In November of the same year, inhabitants of Newark, as members of the Essex County grand jury, patriotically answered the charge of the loyalist chief justice, while in January 1775, the royal newspapers were boycotted by many of the inhabitants of the town. In the spring of that year some of the inhabitants declared that they were willing to risk their lives and fortunes for American liberty. The "gentlemen Traders of this Town" were recommended not to supply provisions to Canada and other loyal portions of North America. In March 1776 the Newark committee regulated the price of West India products, and traders were notified that defiance of regulation would cause the storekeeper to be declared an enemy to his country.

During the Revolutionary War, Newark and the fertile farms surrounding the town were subject to predatory raids, conducted by the Anglo-Hessian troops stationed in New York city and on Staten Island. The most important of a long series of minor engagements, directly affecting Newark, was that of 25 Jan. 1778. The exposed situation of that portion of New Jersey made Newark an object of attack, particularly as there were in the town a number of influential Royalists, whose property was largely confiscated during the later years of the Revolutionary War.

Newark was early identified with the efforts made to secure internal improvements, even before the second war with England. Turnpikes were extended in every direction, bringing the town in close communication with the northwestern portion of the State, from which section Newark has largely drawn men who have become locally prominent. During the early years of the 19th century, the first bank organized in New Jersey (1804) was established in Newark, while one of the chain of State banks (1812) was erected in that city. In 1824 the city was declared by legislative enactment to be the terminal of the Morris and Essex canal, which was soon constructed, and united the waters of New York Bay with those of the upper Delaware. During the early 30's the New Jersey railroad was built between Jersey City and New Brunswick, which with Camden and Amboy connections placed Newark on the direct route between New York and Philadelphia. Following the construction of these lines, now a part of the Pennsylvania railroad system, came railroads now forming parts of the Lackawanna and the Central Railroad of New Jersey systems.

Statistics of Growth.— In 1836 Newark received a municipal charter from the legislature of New Jersey, the township ceasing to exist. Although seriously affected by the panic of 1837, Newark recovered rapidly. By 1840, in the jewelry, leather, brewers and carriage making business there was invested a capital of $1,500,000. From 1820 to 1860 the growth of the city was from 6,500 to 72,000, the accessions being largely foreign-born. From 1840 to 1850 the increase was 125 per cent, while at the present time the population of Newark may be estimated at 275,000. In 1853, the Roman Catholic diocese of New Jersey was set off, with Newark as the episcopal see. Newark had three of the thirty-three Roman Catholic churches then in New Jersey.

Municipal Improvements.— Newark has a total area of about 22 square miles, of which 14 square miles are built up. In that region are 225 miles of improved streets, and 190 miles of sewers. The water supply of the city is furnished through 225 miles of mains, the source for such supply being in water-sheds, lakes and reservoirs in the hills of northern New Jersey. The water plant of the city is valued at $15,000,000. The city is well lighted, and possesses an extensive transportation service by means of steam and electric cars. The total park area of Newark and Essex County embraces about 4,000 acres. Of the 30,000 buildings in the city there are about 170 churches, 20 banks, including the National, State and savings and the trust companies, six department stores, seven theatres, one normal school, two academies (R. C.), one high school 21 grammar schools, 53 primary schools, one school for colored pupils, 13 summer schools and structures for the use of well equipped fire and police departments. There are nine public and private hospitals and about 30 charitable institutions of various kinds. The public library, the collections of the New Jersey Historical Society, the Prudential Insurance Company's Law Library, and the library of the Lawyers' Club are the prominent institutions of their class in the city.

Industries.— As an insurance centre, Newark is exceeded only by New York and Hartford. There are about 3,500 manufacturing plants in Newark, having over $100,000,000 of capital invested and giving employment to 50,000 persons. The annual wages paid these employees amount to about $24,000,000. Of the 225 separate industries in the city, fine jewelry, patent enameled leather, celluloid, campaign buttons and novelties, hats, shoes, harnesses, wagons, cut and stained glass windows, cutlery, clothing, malt liquors, inks, and printing supplies are conspicuous.

Finance.— The total value of the real and personal property is from $275,000,000 to $300,000,000. The city debt is about $13,500,000. The city in 1901 received from all sources about $5,000,000 and disbursed about $4,325,000. Extensive improvements, which will take until 1910 to complete, include public buildings, increased water supply, and school facilities.

Suburbs.— In the hilly country, near Newark, are located the "Oranges" and other suburban communities. Although possessing independent local government, these cities and towns are in such constant business and social relation with Newark as to be practically a part of the city. In the growth of Newark, these communities will become absorbed, under conditions similar to those which existed in Boston and Philadelphia, when annexation of adjacent municipalities occurred. This would add about 100,000 people to the population of a Greater Newark. Pop. (1890) 181,830; (1900) 246,070.

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Editor-in-chief of 'New Jersey as a Colony and a State.'

Newark, N. Y., village, in Wayne County; on the Erie Canal, and on the West S., the

Northern C., and the New York C. & H. R. R.R.'s; about 176 miles west by north of Albany, and 30 miles east by south of Rochester. It was settled in 1820 by people from Rensselaer County in the eastern part of the State. It was incorporated as a village in 1825. It is in a fertile agricultural region, but the village has considerable manufacturing interests. In the tinware works there are 150 employees; in the paper box factories, 150; the glass factory, 50; the canning and preserving factory, 200; and in other establishments fully 200 more employees. Newark has a large trade in farm and dairy products, fruit, and its manufactured articles. Its educational institutions are the Union Free School and Academy, the public elementary schools, and the free public library. There are 10 churches, and a number of church and literary charitable and educational societies. The State Custodial Asylum for Feeble-Minded Women is located here. The three banks have a combined capital of $175,000. The government, according to the "Village Law of the State," is vested in a president and trustees,— eight trustees — two of whom are elected each year. The population consists of nearly all native born Americans, over one half of whom are of Dutch, German, and Irish descent. Pop. (1890) 3,698; (1900) 4,578.

Newark, Ohio, city, county-seat of Licking County; at the junction of three branches of the Licking River and on the Ohio Canal, and the Baltimore & O., and the Pennsylvania R.R.'s; about 30 miles east by north of Columbus, and within 14 miles of the centre of the State. It was settled in 1802 by a colony from the eastern part of the United States. Nearby are two large mounds which belong to the works of the "Mound Builders." It is in an agricultural region, and in the vicinity are valuable deposits of sandstone, extensive coal-fields, and natural gas. The chief manufactures are glassware, chemical instruments, carriages, hardwood, bottles, electric cars, locomotives, machine-shop products, rope, foundry products, flour and lumber products. There are (1903) 21 manufacturing establishments in which there are 7,460 employees. The streets are well paved and well kept. The State Encampment Ground, and the Auditorium, a fine theatre erected as a memorial to dead soldiers of the Civil War, are of much interest. There are 15 churches, a high school, public and parish elementary schools, and a public library, established in 1877. The six banks have a combined capital of $690,000; and the annual amount of business transacted is $3,000,000. The government is administered under the charters in accordance with the Ohio State Municipal Code. The inhabitants are nearly all American born. Pop. (1890) 14,270; (1900) 18,157.

Newark-upon-Trent, England, a town of Nottinghamshire, on the Trent, 17 miles northeast of Nottingham. It has an important trade in malt and flour, large breweries and malting works, iron and brass foundries, agricultural implement, and boiler works. Newark is of great antiquity. On the northwest of the town are extensive remains of the 12th century castle, "the Key of the North," a royalist stronghold three times besieged during the civil war. The adjoining grounds have been converted into a public park. Pop. (1901) 14,985.

Newark Series, in geology, a term applied to that part of the Triassic system (q.v.) in eastern North America. Its limits are Nova Scotia on the north and South Carolina at the south. The typical deposits are near Newark, N. Y., whence the name is taken. The deposits in the series are conglomerates; breccias; thick red sandstones, which must have originated in crystalline waste, as is evident from the comparatively large amount of mica and the feldspaths; and basalt, which accompanies the sedimentary rocks and occurs in dikes and sheets, such that the violent volcanic character of their derivation is made certain. Some few fossils occur in the series, scarcely any of marine types, plants and foot-prints preponderating. The commercial value of the deposits of the Newark series is in the brown sandstone building stone of New Jersey and Connecticut, and the coal veins of North Carolina and Virginia.

Newaygo, nē'wā'gō, Mich., village, county-seat of Newaygo County; on the Muskegon River, and on the Pere Marquette Railroad; about 85 miles in direct line northwest of Lansing, the capital of the State. It is in a lumbering region, and is also well known as a hunting and fishing section. The manufactures are flour, lumber products, furniture, cement, and cigars. Pop. (1890) 1,330; (1900) 1,172.

Newbern, nū'bėrn (formerly NEW BERNE), N. C., city, county-seat of Craven County, port of entry of the Pamlico district; at the confluence of the Neuse and Trent rivers, and on the Atlantic C. L., the Atlantic & N. C., and the Pamlico, O. & W. R.R.'s; about 100 miles in direct line southeast of Raleigh. It has regular steamer connection with New York and other Atlantic ports. It was settled in 1710 by a company of Swiss and Germans under Baron De Graffenreid. The place was named "New Berne" after Berne in Switzerland. It was incorporated as a city in 1723. It soon became an important southern seaport, on account of its harbor. It was the capital of the Province of North Carolina for several years. It was one of the strongly fortified ports of the Confederacy. (See NEWBERN, OPERATIONS AT, IN THE CIVIL WAR.) The chief industrial establishments are lumber and planing mills, grist mills, shingle factories, fertilizing works, ice factory, knitting mill, pickle works, turpentine distillery, ship-yard, carriage factory, lime kiln, canning factory, and the Atlantic & North Carolina railroad-shops, in all having 2,500 employees. There is an extensive trade in lumber, cotton, turpentine, vegetables, and fish. The prominent buildings are, a government building (court-house, custom-house, and post-office), the county court-house, jail, County Home, and the opera house. The educational institutions are the public schools, separate for white and colored. There are 10 church edifices and others in contemplation. The three banks have a combined capital of $152,000. The government is vested in a mayor, board of aldermen, and a council of 12 members. The electric-light plant and the waterworks are owned and operated by the city. About 95 per cent of the inhabitants are native born Americans. Pop. (1890) 7,843; (1900) 9,090.

C. L. STEVENS,
Editor 'New Berne Journal.'

Newbern, Operations at, in the Civil War. Roanoke Island (q.v.), N. C., was captured by Gen. Burnside 8 Feb. 1862, and on 6 March he embarked his troops for an expedition against Newbern, a point of much military importance, at the confluence of the Neuse and Trent rivers, near the head of an extensive and navigable arm of the sea, and connected by railroad with Beaufort Harbor at Moorehead City. By night of the 11th the entire naval and land command was off the mouth of Slocum's Creek, south of the Neuse, and about 15 miles below Newbern. The approaches to the city had been obstructed by sunken vessels and a double row of piles in the river. Four miles below the city, on the southern side of the river, and opposite the obstruction in the stream, was Fort Thompson, mounting 13 heavy guns. From the fort inland was a line of rifle-pits and redoubts extending about two miles to and beyond the Atlantic and North Carolina Railroad, and terminating on almost impassable ground. In the fort and on this line were 41 heavy guns and 19 field-pieces. The position was held by seven North Carolina regiments, a battalion of militia, and three batteries of artillery, numbering in all some 5,000 men, under command of Gen. L. O'B. Branch. Burnside's troops, 13 regiments of infantry, about 9,000 men, and 8 guns, were landed by noon of the 13th, and after a hard march in rain and deep mud bivouacked near the Confederate position, the naval vessels, under Commodore Rowan, moving up the river abreast of the infantry, and shelling the road and woods in advance. On the morning of the 14th the attack was made. Gen. J. G. Foster, with the 10th Connecticut and the 23d, 24th, and 28th Massachusetts, moved up a country road on the right; Gen. J. L. Reno on the left, with the 21st Massachusetts, 9th New Jersey, 51st New York, and 51st Pennsylvania, moved along the line of the railroad; while Gen. J. G. Parke, with the 4th and 5th Rhode Island and 11th Connecticut, moved in the centre, on a country road, as a reserve. Foster began the battle about 8 A.M. by an attack on Fort Thompson and the line near it, maintained the brunt of the contest for some time, and was reinforced by Parke. Meanwhile Reno had gained ground on the left, the entire division now became engaged, and the Confederates, after a resistance of four hours, broke and retreated to Newbern, burning behind them the railroad and turnpike bridges over Trent River. Burnside followed, crossed the Trent in boats, Branch retreating, and in the afternoon the Union troops occupied the city, capturing many heavy guns and other material. The Union loss was 90 killed, and 380 wounded. The Confederate loss was 64 killed, 101 wounded, and 413 captured or missing.

Confederate Efforts to Recapture Newbern. —The fall of Newbern was a serious blow to the Confederates, but the necessities of the army in Virginia forbade attempt to regain it until after the close of the campaigns of 1862, when troops were sent to North Carolina, and 13 March 1863, Gen. D. H. Hill, who had been assigned to the command in the State, organized an expedition for its recapture. Gen. Daniel's brigade moved from Kinston toward Newbern by the lower Trent road; Gen. Robertson's cavalry brigade was sent by the upper Trent road; and Gen. Pettigrew, with five North Carolina regiments and 15 guns, was ordered to approach the city near Barrington's Ferry, north of the Neuse, to attack two small gunboats in the river, and capture Fort Anderson, an earthwork on the river, opposite the city, garrisoned by 300 men of the 92d New York. At Deep Gully, a few miles out of Newbern, Daniel attacked five companies of the 25th Massachusetts, supported by two guns, and drove them in, but advanced no farther, as Pettigrew had failed. That officer, at daylight of the 14th, appeared in front of Fort Anderson and demanded its surrender, which was refused, and Pettigrew opened fire from all his guns, and engaged the gunboats Hetzel and Hunchback, which had been towed into position. The fire of the gunboats, with that of five guns of a battery of rifled guns from the other side of the Neuse, caused Pettigrew to withdraw and cover the movement of the 85th New York to reinforce the 92d. The casualties on either side were insignificant.

On 20 January 1864, Gen. Lee ordered Gen. Pickett, then at Petersburg, Va., to capture Newbern if upon examination he found it practicable, and authorized him to use four brigades of his command for the purpose, in addition to which he promised to assist him with Hoke's brigade of the Army of Northern Virginia. He gave detailed instructions for the movement, and all the Confederate forces in eastern North Carolina were to co-operate and retake Newbern, Plymouth, Washington, and other coast towns. On the morning of 30 January the movement began from Kinston in three columns; Gen. Barton, with his own brigade, Kemper's, part of Ransom's, 14 guns, and 600 cavalry, was directed to cross the Trent, take the works in front of Newbern in reverse, and cut off communication with the place. Col. Dearing was sent north of the Neuse with a cavalry force, two infantry regiments, and three guns, to attack Fort Anderson. Col. J. T. Wood, with picked crews in boats, was to descend the Neuse, seize the Union gunboats, and co-operate with Dearing in the attack on Fort Anderson. Gen. Pickett, with Hoke's brigade, three regiments of Corse's, two of Clingman's, and 10 guns, was to advance by the Dover road. Newbern had been strongly fortified, and was held by 2,000 men, under Gen. I. N. Palmer, and three gunboats were stationed in the Neuse and Trent rivers. An outpost of 300 men of the 132d New York was at Bachelor's Creek, eight miles above Newbern. Gen. Hoke, advancing by the Dover road, on 1 February, at Bachelor's Creek encountered the Union outpost, which was driven in after a severe Federal loss, and Pickett with his column crossed the creek and advanced toward Newbern. The batteries opened upon him; he made no attack, but awaited the result of the co-operating movements. Col. Wood, with 10 rowboats, carrying picked crews of 15 men each, armed with rifles and cutlasses, left Kinston at noon of 31 January, dropped down the river, and at 4 A.M. of 1 February arrived near the town; but, owing to a fog, he could not locate the position of the gunboats. He finally located the Underwriter, moored close in shore, near the wharf, and not more than 100 yards from three

batteries; and at night he boarded her, killing her commander and some of the crew, and capturing a third of the remainder in a hand-to-hand conflict. The fires under the boilers of the vessel were very low, and in attempting to tow her out Wood was subjected to fire of artillery and infantry from the forts on shore, and therefore he set her on fire. Pickett waited for Barton's movement, which failed, and after a feeble demonstration he gave up the enterprise and withdrew to Kinston, after a loss of 45 killed and wounded. The Union loss was 326 killed, wounded, and missing.

The third attempt on Newbern was made by Gen. Hoke, who, after his capture of Plymouth, N. C. (q.v.), 20 April 1864, moved against the place and demanded its surrender, and on being refused began a siege. Hoke was recalled to Kinston, 5 May, and ordered to Petersburg, Va. Consult: 'Official Records,' Vol. IX., XVIII., XXXIII., XXXVI., and The Century Company's 'Battles and Leaders of the Civil War,' Vol. I. E. A. CARMAN.

Newberry, nū'bĕr-ĭ, **John Strong,** American geologist: b. Windsor, Conn., 22 Dec. 1822; d. New Haven 7 Dec. 1892. His early life was passed chiefly in the Western Reserve, Ohio, and he was graduated at the Western Reserve College in 1846 and at the Cleveland Medical School in 1848. From 1851 to 1855 he practised medicine in Cleveland. He was assistant surgeon and geologist to the government expedition that explored the country between San Francisco and the Columbia River; also accompanied Lieut. Ives in his exploration of the Colorado River, and the expedition under Captain Macomb in its exploration from the Santa Fé to the junction of the Grand and Green rivers. His reports upon the scientific results of these expeditions brought him great credit in the scientific world. At the beginning of the Civil War he became attached to the Sanitary Commission, and later secretary of its Western department. He was afterward connected with the Smithsonian Institution, and with the Columbian University, Washington, and in 1866 was appointed professor of geology and palæontology at the Columbia College School of Mines, which post he retained till his death. Besides many special reports and parts of general reports, his writings include: 'The Rock Oils of Ohio' (1859); 'Catalogue of the Plants of Ohio' (1860); 'Iron Resources of the United States' (1874); 'The Structure and Relations of Dinichthys' (1875); 'Palæozoic Fishes of North America' (1889); 'Later Extinct Floras' (1898); etc. He was especially conversant with the palæontology of the Carboniferous Era in America, and particularly with extinct fishes; and as a teacher he had great popularity and influence. He was among the early members of the National Academy of Sciences.

Newberry, S. C., town, county-seat of Newberry County; on the Atlantic Coast Line and the Southern R.R.'s; about 40 miles northwest of Columbia. It is in a region in which the cultivation of cotton is one of the chief industries. It has manufacturing establishments for cottonseed-oil, cotton goods, preparing cotton for shipment, coffins, fertilizers, and lumber products. It has considerable trade, chiefly in cotton products, fruit, and vegetables. It has a fine court-house and city-hall, and is the seat of Newberry College, a coeducational institution founded in 1858 under the auspices of the Lutheran Church. The city owns and operates the electric-light plant and the waterworks. Pop. (1890) 3,020; (1900) 4,607.

Newbery, nū'bĕr-ĭ, **John,** English publisher and bookseller: b. Waltham Saint Lawrence, Berkshire, 1713; d. London 22 Dec. 1767. Going to London he began, in 1745, in Saint Paul's Churchyard, the publishing and selling of books. He also published 'The Universal Chronicle and Weekly Gazette,' in which Johnson's 'Idlers' appeared, and 'The Public Ledger,' in which Goldsmith's 'Citizen of the World' was printed. Newbery made a specialty of books for children, and published the 'Juvenile Library,' a choice collection of volumes, among which were 'Goody Two Shoes,' 'Tommy Trip and His Dog Growler,' and other surviving favorites. His intimate association with famous authors, the merits of his own work, and the reputation which he left for a spirit and life of benevolence combine to perpetuate an interest in Newbery's memory.

New'bolt, Henry John, English author: b. Bilston, Staffordshire, 6 June 1862. He was educated at Clifton and Oxford and was called to the bar of Lincoln's Inn in 1887. After practising his profession till 1899 he established the next year the London 'Monthly Review,' which he has since edited. He has published 'Taken from the Enemy,' a novel (1892); 'Mordred,' a tragedy (1895); 'Admirals All' (1897), verse; 'The Island Race' (1897); 'Stories from Froissart' (1899); 'Froissart in Britain' (1900); 'The Sailing of the Long-Ships' (1902).

Newbolt, William Charles Edmund, English Anglican clergyman and author: b. Somerton, Somerset, 14 Aug. 1844. He was educated at Oxford, was vicar of Dymock 1870–7, and of Malvern Link 1877–88. He was principal of the Theological School, Ely, 1887–90 and is a canon and chancellor of St. Paul's Cathedral. Among his published works are 'Counsels of Faith and Practice' (1883); 'The Prayer Book: its Voice and Teaching' (1889); 'The Dial of Prayer' (1901); 'Apostles of the Lord' (1901).

Newborn, a sect of Antinomians, which arose in the United States in the early part of the 18th century. Its founder was a German immigrant, named Mathias Bawmann (who died 1727). They held the doctrine of the deification of humanity by regeneration. They denied that the Bible was necessary for the illumination of Christians, and scoffed at the sacraments. They claimed that their regeneration or newbirth was brought about by dreams, apparitions and supernatural inspiration, and was like the new name written on the white stone and known only to him that receiveth it (Rev. ii. 17).

Newburgh, nū'bĕrg, N. Y., city in Orange County; on the west bank of the Hudson River, and on the Erie and the West Shore R. R.'s; 58 miles north of New York. The first settlement was made by emigrants from the Rhenish Palatinate, in the winter of 1798–9. They called the place, "Palatine Parish by Quassaic." The Germans were soon followed by emigrants from Great Britain, and in 1750 the English and Scotch were there in numbers sufficient to change the name to "Parish of Newburgh" in

memory of Newburgh, in Aberdeen County, Scotland. Before the Revolution the farmers from the river brought their produce here to be sent to market. The lumber trade was most important; ships were built for trade with the West Indies and London; and at one time whaling was an industry of Newburgh. The city occupies a prominent place in the history of the Revolution. It was Washington's headquarters from March 1782 until 18 Aug. 1783. The "Hasbrouck House," which Washington occupied in Newburgh, was purchased in 1849 by the State of New York, and is now used as a museum for Revolutionary and Colonial relics. It is in charge of a board of trustees who have had it restored as when Washington occupied it. While in Newburgh, Washington received the letter (see NICOLA, LEWIS) asking him to become king; here the army was disbanded, and from here the Newburgh Addresses (q.v.) were issued. In 1899 Newburgh was incorporated as a village, the third in the State. After its incorporation the enterprising inhabitants built turnpikes to the farming sections west of the village, and in this way secured the trade of the farmers in the vicinity. Until 1830 sailing vessels plied regularly between New York and Newburgh, but after that date steamboats were used. The opening of the Erie Canal diverted considerable trade from the village. The first general rowing regatta on the Hudson River was held here in 1837. Others followed in 1840, 1841, and 1842. The country around has many places of historical interest. (See NEW YORK.) It was granted a city charter in 1865.

The city, viewed from the Hudson River, presents a pleasing arrangement of terraced slopes, broad, clean streets, many trees, and beautiful buildings. It is about 310 feet above the river, or Newburgh Bay, as the river expansion here is called. It is in an agricultural region, the commercial centre of an extensive section and of a number of large industries. The chief manufactures are machine-shop products, plaster, cotton and woolen goods, felt hats, silk, leatherette, powder, paper, carpets, flour, lumber, foundry products, dairy products, overalls, and cigars. It has ship-yards, extensive coal, brick, and lumber yards. Large quantities of coal from Pennsylvania are brought here to be loaded in coasting vessels and barges. There are over 4,000 employees in the industrial establishments. On the northeast corner of the grounds surrounding the "Headquarters" is the "Tower of Victory," made of stone, 53 feet high, with four archways leading into an atrium, and stairways leading into a belvedere. It contains a bronze statue of Washington, copied by O'Donovan from Houdon's model. Other statues represent the soldiers in the War of the Revolution. A tablet bears an inscription telling that the monument was erected by the authority of the Congress of the United States and of the State of New York. It cost $67,000. The block of brownstone near the entrance marks the grave of Uzal Knapp, the last survivor of Washington's Life Guard; died in 1856. Newburgh has the first free public library in the State, a hospital, orphanage, and Home for the Friendless. Its educational institutions are five large public schools, two large parish schools (R. C.), a free academy, Saint Patrick's Academy, and Mount Saint Mary's Academy. There are 25 churches, one of them for colored people. The three banks and one trust company have a combined capital of $1,370,000; the annual amount of business is about $3,000,000. The revised charter of 1898 provides for a mayor and council. The mayor holds office two years; the council has 13 members. The board of education, the almshouse commissioners, and the water commissioners are chosen by popular vote; the city clerk is elected by the council, and the other administrative officials are appointed by the mayor subject to the approval of the council. The city owns and operates the waterworks. Pop. (1890) 23,087; (1900) 24,943. Consult: Ingersoll, 'Handy Guide to Hudson River'; Nutt, 'Newburgh: Her Institutions, Industries, and Leading Citizens' (1891); Ruttenber, 'Town of Newburgh'; Powell, 'Historic Towns of the Middle States.'

FREDERICK W. WILSON,
Editor 'Newburgh Daily News.'

Newburgh Addresses, in American history, a term applied to two anonymous letters, appearing in 1783, after the close of the Revolution. They were written upon behalf of the American soldiers whose pay had been withheld. It was afterward made known that General John Armstrong was the author of the letters.

Newburgh Sedition, in American history; while Gen. Washington had his headquarters in Newburgh, on the Hudson, December 1782, great dissatisfaction manifested itself among his officers, and they addressed a memorial or "round robin" to Congress, demanding their back pay, and security for future services. Congress refused to grant the demands, and in the following March an attempt was made to inaugurate a revolt. The matter became so serious that Washington appeared before a meeting of the malcontents and delivered such a patriotic address that the spirit of insubordination immediately disappeared.

Newburyport, nū"bŭr-ĭ-pōrt', Mass., city and one of the county-seats of Essex County, on the Merrimac River, three miles from the sea, 35 miles northeast of Boston and on the Boston & Maine railroad. It extends for about three miles along the bank of the river, but the streets leading back from the river are short; High Street, the principal residence street, lies parallel with the river, and State Street, the chief business street, is perpendicular to it. In the upper part of the city the river is crossed by a chain bridge (built 1792), the first suspension bridge in America. Among the notable buildings are the Putnam High School, the Anna Jacques Hospital, the Y. M. C. A. Memorial Building, the Old South Church, which contains the remains of George Whitfield, and the public library, formerly the old Tracy mansion, where Washington and Lafayette were entertained; the library contains about 40,000 volumes. The house in which William Lloyd Garrison was born is also in the city. In the days of wooden sailing vessels, the chief industry of Newburyport was shipbuilding, and many of the most famous clipper ships were built there; some small vessels are still built. The harbor is good, but access to it difficult on account of the shifting sand bar at the mouth of the river; there is a considerable trade in coal brought to the city by coasting schooners. The more important industries now include boot and shoe factories, cotton fac-

tories, hat shops, an iron foundry, and a silver factory. The mayor, city council and board of aldermen are elected annually. The city owns and operates its waterworks, which were bought from a private company after considerable litigation. Newburyport was settled about 1635, separated from the town of Newbury in 1764, and chartered as a city in 1851. It sent a large quota of troops to the Civil War, and many of its citizens, who were sea-captains, received money from the Alabama claims. Pop. (1900) 14,478.

Newcastle, nū'kăs-l, **Henry Pelham Fiennes Pelham Clinton,** 5TH DUKE OF, English colonial secretary: b. London, England, 22 May 1811; d. Clumber Park, England, 18 Oct. 1864. He took his degree at Christ Church, Oxford, in 1832 and sat in Parliament for South Notts 1832–46. He held various offices until 1852, when he was appointed colonial secretary for the colonies under Lord Aberdeen, and in 1854 when the war with Russia broke out was appointed to the newly created war office. He was bitterly assailed for his administration of affairs though doing all that was possible, and in 1855 he resigned and went to the Crimea to investigate the condition of the army. He was reappointed secretary of the colonies in 1859, but failing health compelled his resignation in 1864, shortly before his death.

Newcastle, Margaret, DUCHESS OF. See CAVENDISH, MARGARET.

Newcastle, Thomas Pelham Holles, 1ST DUKE OF, English prime minister: b. England, 1693; d. August 1768. He was the son and heir of the 1st Lord Pelham and as one of the largest land-owners in England his influence, which he used freely in the service of the king, won favor at court and he was made Duke of Newcastle in 1714. He was appointed secretary of state in 1724, under Walpole, and though not a man of brilliant ability held this post until he became prime minister in 1754. He retired in 1756, but was recalled in 1757 and formed the ministry so notable because of the brilliancy of Pitt. He again resigned in 1762, and afterward lived a retired life with the exception of holding for a few months in 1765 the office of Lord Privy Seal.

Newcastle, William Cavendish, DUKE OF. See CAVENDISH, WILLIAM, DUKE OF NEWCASTLE.

Newcastle, Australia, a town and port of New South Wales, at the outlet of the Hunter River, 102 miles by rail northeast of Sydney. It is a busy industrial centre, with numerous coal mines and factories, and is the chief port of the north coast, its shipping almost equaling that of Sydney; coal and wool are the principal exports. The United States is represented by a consul. Pop. (1901) 14,250.

Newcastle, Del., city in New Castle County; on the Delaware River, and on the Philadelphia, B. & W., and the Philadelphia & R. R.R.'s; about seven miles south of Wilmington. It was settled, in 1640, by Swedes. Later it was occupied by the Dutch and then by the English. In 1875 it was incorporated. Newcastle was the place where, in 1682, William Penn landed in America. It is in an agricultural region where much attention is given to fruit orchards and market gardens. Its good harbor, regular steamer connection with large cities, and railroad facilities make it an excellent shipping point for farm products, fruit, and vegetables. Considerable fish, especially shad, are caught in the nearby waters. Its chief manufactures are flour, brick, canned goods, woolen and cotton goods, iron products, and men's underclothing. Newcastle has a library founded in 1812, several buildings dating back to Colonial times, and a number of fine modern houses. Pop. (1890) 4,010; (1900) 3,380.

Newcastle, Ind., town, county-seat of Henry County; on the Blue River, and on the Pittsburg, C., C. & St. L., the Cleveland, C., C. & St. L., and the Lake Erie & W. R.R.'s; about 40 miles northeast of Indianapolis. It is in a fertile agricultural and also a manufacturing region. The chief manufactures are agricultural implements, flour, paper boxes, iron and steel products, bridge works, pianos, brass furniture, carriages, brick, and furniture. It has natural gas, good water-power, and excellent transportation facilities. The city owns and operates the street-lighting plant and the waterworks. Pop. (1890) 2,697; (1900) 3,406.

Newcastle, Pa., city, county-seat of Lawrence County; at the confluence of the Shenango and Neshannock rivers, and on the Pennsylvania, the Erie, the Western N. Y. & P., the Pittsburg & W., and the Pittsburg & L. E. R.R.'s; about 45 miles in direct line northwest of Pittsburg. It was settled in 1812, and received its city charter in 1869. It is in a productive agricultural region, and in the vicinity are extensive coal fields, and deposits of iron ore, limestone, sandstone, and fire clay. The chief manufactures are glass, iron, flour, paper, agricultural implements, lumber, stoves, nails, tin plate, steel wire nails, and boilers. It has a large trade in its manufactured articles, coal, farm products, and building stone. Cascade Park is a favorite resort. The educational institutions are the public and parish schools and the Y. M. C. A. library. The revised charter of 1887 provides for a mayor who holds office three years, and a council. Pop. (1890) 11,600; (1900) 28,339.

Newcastle-upon-Tyne, tīn, England, a city, important port, and municipal county, the capital of Northumberlandshire, on the Tyne, nine miles from its mouth, and 273 miles by rail northwest of London. It occupies the sides and summits of three acclivities, which rise steeply from the river, and extends about two miles along its bank. The High Level Bridge, one of the greatest engineering achievements of Robert Stephenson, affords ready access to the borough of Gateshead (q.v.). About half a mile to the west is an iron suspension bridge, and there is also a new low-level stone bridge, with a swing bridge for the inlet and outlet of vessels. In the older portions the streets are narrow and winding. In the newer parts are many handsome streets and squares, of which Grey Street and Grainger Street are among the finest. The most important public buildings are the cathedral of St. Nicholas, an ancient Gothic structure of great beauty, and other fine ecclesiastical buildings, including the Roman Catholic church and cathedral of St. Mary, a modern building in the early English style; the town hall, a large modern edifice; the central exchange, Art Gallery,

and Newsroom, forming a spacious semicircular Ionic building; Wood Memorial Hall, the College of Physical Science; the Guildhall and Exchange beneath it, the Merchants' Court, the corn exchange, the assembly-rooms, the Moot Hall, in which the assizes for the county are held; the castle, one of the finest specimens of castellated Norman in England, recently restored; the Central Railway station; the jail and house of correction; the Mining Institute; the public library; the People's Palace; the museum of the Natural History Society; public baths and several commodious markets. The chief monuments are those erected to Earl Grey (1838) and George Stephenson (1862).

Among the literary and other institutions are the Free Grammar-school, and many other schools; the Northern Counties Institution for the Deaf and Dumb; Northern Counties Orphanages; the College of Medicine and Surgery, and the College of Physical Science, both institutions affiliated to Durham University; the Mining Institute; the Literary and Philosophical Society, occupying a handsome Doric building, in which are a museum and library; the infirmary, the Victoria Blind Asylum, the Hospital of St. Mary Magdalene, several other hospitals and charitable endowments; the Antiquarian Society, the Botanical and Horticultural Society, and the government school of design. The chief public parks are the Town Moor (987 acres), the Leazes, Elswick, Brandling, Nuns Moor, Heaton, the Armstrong Park, and Jesmond Dene. The last two were given to the city by Lord Armstrong.

Within the town, or in its immediate vicinity, are numerous blast-furnaces, and important malleable and other iron works. Hardware and large castings, locomotives and other machinery, are made at numerous large establishments. There are here also immense chemical works. The other manufactures of importance are earthenware, glass, sheet and pipe lead, cordage and cables, painters' colors, soap, railway and other carriages, brassware, patent shot, bricks and tiles, paper, sailcloth, etc.; while the extensive shipbuilding and ordnance works at Elswick, founded by Lord Armstrong in 1847, afford employment to about 16,500 men. There are also flax-spinning mills; flour, bone, oil, and saw mills; and extensive building-yards, at which great numbers of sailing vessels and steamers are constructed. The coasting and export trade, especially in coal, is very important, whence the satirical proverb "Carrying coals to Newcastle." In 1900 the total amount of coal, coke, and patent fuel shipped from Newcastle and its dependent Tyne ports, North Shields, and South Shields, was 8,124,022 tons. The total value of exports from these three ports was about $55,000,000; imports, about $50,000,000; gross amount of customs received, $1,900,000. The total number of vessels that cleared from Newcastle, North and South Shields, for foreign and colonial ports in 1900 was 6,457, having an aggregate burden of 4,894,157 tons; the total number entered was 5,335, with a burden of 3,897,142 tons. In the coasting trade the number of vessels, British and foreign, that cleared from the three ports already mentioned was 7,632, the total tonnage being 3,374,073; the number entered was 8,750, with a total tonnage of 4,428,133. Vast improvements have been made on the river by the Tyne Commissioners. (See TYNE.) The trade with the United States amounts annually to about $20,000,000. The United States is represented by a consul.

The town is situated at the eastern termination of the wall of Hadrian, and Roman antiquities have been repeatedly discovered in it. In the Anglo-Saxon period it was a monastic centre, and latterly was called Monkchester. The fortress was built by Robert, son of William the Conqueror, about 1080, about which time it received its present name. It received a charter from King John, but the oldest extant is said to be by Henry III. in 1229, which confers the right of digging for coal in the neighborhood. The coal trade had attained some importance by 1280. Newcastle was a frequent object of attack, and was repeatedly taken in the wars between England and Scotland. It furnished 17 ships to Edward III. for the siege of Calais. It was taken possession of by the Scottish Covenanting army in 1640 and in 1644, and in 1647 Charles was delivered here by the Scottish army to the parliamentary commissioners. Pop. (1901) 214,803.

Newcomb, nū'kŏm, **Harry Turner,** American statistician: b. Owosso, Mich., 4 Jan. 1867. He was graduated from the law department of Columbian University in 1891, and entered the offices of the Chicago, Milwaukee & St. Paul railroad in 1882. In 1895–9 he was chief of the transportation department of the division of statistics in the United States department of agriculture, and in 1899–1901 was expert chief of the division of agriculture for the United States census. In 1896–1901 he was lecturer on statistics at Columbian University; and in 1901–3 he was editor of the 'Railway World.' He has written: 'Railway Economics' (1898); 'The Postal Deficit' (1900); etc.

Newcomb, Simon, American mathematician and astronomer: b. Wallace, Nova Scotia, 12 March 1835. He came to the United States in 1853 and taught in Maryland; computed on the 'Nautical Almanac' at Cambridge 1857, and was graduated from the Lawrence Scientific School at Harvard 1858. He was appointed professor of mathematics in the United States Navy in 1861 and assigned to duty at the Naval Observatory; negotiated contract for and supervised construction of the great telescope; was secretary of the transit of Venus commission (1871–82); and observed transit at the Cape of Good Hope in 1882. He also has directed several parties to observe eclipses beginning in 1860. From 1877–97 he was senior professor of mathematics and superintendent of the Nautical Almanac Office. He retired from active duty in the navy (1897) at the required age of 62, and has since devoted himself to both pure and popular science. He was professor in Johns Hopkins University 1884–93, and editor of the 'American Journal of Mathematics,' retiring in 1901. He is a member of the Royal Academies of Bavaria, Leyden, Upsal, Stockholm, Prussia, Brussels, Ireland, Rome, Lombardy, and New South Wales; of the Royal Society, the Royal Institution and Royal Astronomical Society of Great Britain, the Sociedad Astronomico de Mexico, the Königliche Gesellschaft der Wissenschaften (Göttingen), and the Russian Astronomical Society; he is also associate fellow American Academy Arts and

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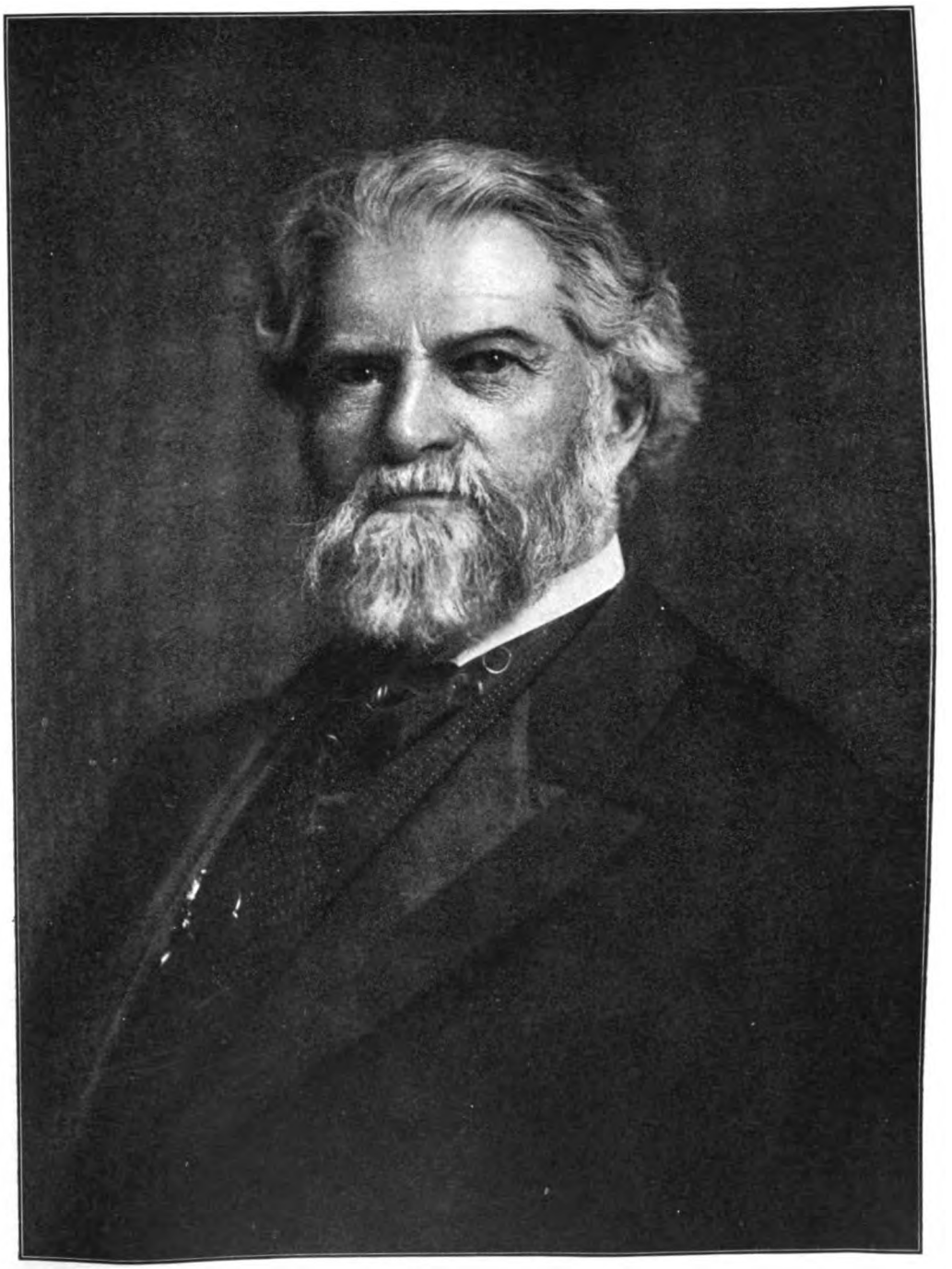

SIMON NEWCOMB.

Main

Sciences, an honorary member of the Imperial Academy of Sciences (St. Petersburg), of the Cambridge Philosophical Society, of the Philosophical Society of Philadelphia, of the Imperial Geographic Society of Russia (1897), and of the Society for the Encouragement of Arts, Manufacture, and Commerce (London, 1897). Since 1874 he has been correspondent and since 1893 associate of the Institute of France, being the first native American to receive the latter honor since Franklin; he is also an officer of the Legion of Honor. He has been president of the Political Economy Club, of the American Association for the Advancement of Science (1887), of the Society for Psychical Research (1885–6), of the American Mathematical Society (1897–8), of the Astronomical and Astrophysical Society of America since its foundation in 1899; vice-president of the National Academy of Sciences (1883–9) and its foreign secretary (1903). He is president of the International Congress of Arts and Sciences at St. Louis (1904). He has received the Royal Astronomical Society medal (1874), the Huygens medal (1878), the Copley medal of the Royal Society (1890), the Bruce medal of the Astronomical Society of the Pacific (1898), the Schubert prize from Russia, two bronze vases from Tokyo University, and the Sylvester medallion from Johns Hopkins. In 1887 the Russian government ordered his portrait for the Royal Observatory, and in 1897 it was painted for the Johns Hopkins. Among his degrees are: LL.D. from Columbian 1874; Yale 1875; Harvard 1884; Columbia 1887; Edinburgh 1891; Glasgow and Princeton 1896; Cracow 1900; Johns Hopkins 1902; Sc.D. Heidelberg 1886; Padua and Dublin 1892; D.C.L. Oxford 1899; Dr. of Math. Christiania 1902; Master of Mathematics and Dr. of Natural Philosophy Leyden 1875; Dr. of Science, Cambridge 1896.

He has lectured at Harvard, the Lowell Institute at Boston, etc., and has delivered opening addresses at the Flower, Yerkes, and other observatories. In connection with his work on Mathematical Astronomy, besides over 100 papers published in various scientific journals, he has written large works 'On the Secular Variations, and Mutual Relations of the Orbits of the Asteroids' (1860); 'An Investigation of the Orbit of Neptune' (1874); 'Researches on the Motion of the Moon' (1876); 'Theory of the Inequalities in the Motion of the Moon' (1894); 'Tables of Uranus'; 'Measure of the Velocity of Light' (1884); 'Uranian and Neptune System'; 'Astronomical Constants and Eclipse Tables. He founded the Astronomical Papers of the American Ephemeris, and edited the first eight of this series, which contain his tables of the planets and of the stars now used by astronomers all over the world. Among his more popular writings are 'Popular Astronomy'; 'School Astronomy'; 'Elements of Astronomy, Algebra Geometry, Analytical Geometry, Calculus, Essentials of Trigonometry.' 'The Stars' (1901); 'Astronomy for Everybody' (1902); 'A B C of Finance'; 'A Plain Man's Talk on the Labor Question'; 'Principles of Political Economy'; 'His Wisdom the Defender'; 'Reminiscences of an Astronomer' (1903).

Newcomb Memorial College for Women, New Orleans. See TULANE UNIVERSITY.

Newcomen, nū-kŏm'ĕn, **Thomas,** English inventor of the atmospheric steam pump: b. Dartmouth, Devonshire, February 1663; d. London August 1729. With the financial help of John Cawley he experimented on Savery's engine, patented 1698, and possibly had made previous study of the same problem at an earlier date. His improvement of Savery's engine consisted principally in separating boiler, pump, and condenser. Steam was let into a cylinder from below, and a piston above was thus forced up so that a pump rod attached to it by a balance arm was driven downward; cold water was then introduced into the condensing cylinder, a vacuum was there formed, and the external atmospheric pressure drew the piston down into the cylinder, the pump rod being forced up by this action. Newcomen's engine is practically the modern type, which, however, has Watts' condenser; it was successfully used, notably for pumping water from mines. An engine after Newcomen's model built in 1745 is still in use in the mines of the Ashton Vale Iron Company near Bristol. See STEAM ENGINE.

Newcomes, nū'kŭmz, **The,** a novel, by W. M. Thackeray, published in 1854. It presents a lifelike picture of English society in the first half of the 19th century, and excels in the presentation of individual types. In Colonel Newcome we are shown perhaps the most perfect type of a gentleman to be found in the whole range of fiction.

Newdigate (nū'dĭ gāt) **Prize,** a prize in Oxford University, annually awarded for an English poem. It was founded by Sir Roger Newdigate, Bart. (1719–1806), its value being $110. Among the winners have been several well-known men, such as Ruskin, Matthew and Sir Edwin Arnold, John Addington Symonds, and W. H. Mallock.

New'el, in architecture, the central space or column round which the steps of a circular staircase are wound. When there is no central pillar the newel is said to be open. The term newel post is also used in this connection.

Newell, nū'ĕl, **Peter** ("SHEAF HERSEY"), American illustrator and humorist: b. McDonough County, Illinois, 5 March 1862. He was educated at Bushnell, Ill., worked for a photographer, drew crayon portraits, studied in New York at the Art Students' League, and in the early nineties became famous for his whimsical illustrations to humorous books and for his own pictures with text, which appeared in various periodicals and were collected as 'Topsys and Turvys' (1893–4), 'Peter Newell's Pictures and Rhymes' (1899), etc. His later work with its striking use of flat tones, possibly traceable to Japanese influence, is to be seen in the illustrations to Lewis Carroll's 'Alice in Wonderland,' 'Alice in the Looking-Glass,' and 'The Hunting of the Snark.'

Newell, Robert Henry, American humorist, whose pseudonym was "ORPHEUS C. KERR," that is "Office Seeker": b. New York 13 Dec. 1836; d. Brooklyn 1 July 1901. He was educated in New York; became assistant editor of the 'Sunday Mercury' in 1859; for it wrote his first 'Orpheus C. Kerr papers,' which were continued in three volumes (1861–4), none possessing much deeper humor than the kind suggested by the title. He was a war correspond-

ent of the New York *Herald;* acted as an editor of the New York *World,* then of the *Daily Graphic,* and later of the 'Hearth and Home,' which he left in 1876. In 1878 he began to suffer with writer's cramp and letter-blindness, from which he never recovered. Besides his humorous sketches Newell wrote: 'There Was Once a Man,' an anti-Darwinian romance (1884); 'Avery Glibun' (1867); 'The Palace Beautiful' (1865), and 'Versatilities' (1871), both volumes of verse; 'The Cloven Foot,' an adaptation of 'Edwin Drood' (1870); and 'The Walking Doll,' a novel of New York life (1872).

Newell, William Wells, American folklorist: b. Cambridge, Mass., 24 Jan. 1839. He was graduated from Harvard in 1859 and from the Harvard Divinity School in 1863, and entered the Unitarian ministry, but retired from that profession to become a teacher and writer. He is secretary of the American Folk-Lore Society and in 1888–1900 edited the 'Journal of American Folk-Lore.' He has written 'Games and Songs of American Children' (1883); 'King Arthur and the Table Round' (1897); 'Legend of the Holy Grail' (1902); etc.

Newfoundland, nū-fownd'land, nū-fŭnd-land', or nū'fŭnd-land, North America, an island in the Atlantic Ocean at the entrance to the Gulf of Saint Lawrence, the tenth island in size of the world, with its dependency Labrador (q.v.), the easternmost part of the coast of Canada, constituting the oldest colony of Great Britain. It lies between lat. 46° 37′ and 51° 39′ N., and lon. 52° 35′ and 59° 25′ W., and is the nearest point of the Western Hemisphere to Europe, its easternmost projection being 1,640 miles distant from Ireland. Its northern part is separated from the eastern extremity of Labrador by the Strait of Belle Isle, ten miles wide, and its southwestern extremity from Cape Breton practically the eastern point of Nova Scotia, by Cabot Strait, the great entrance to the Gulf of Saint Lawrence, 65 miles wide. Its greatest length, north to south, is 350 miles; average breadth 130 miles, maximum 316 miles, area 42,200 square miles, or three times as large as Holland, twice as large as Denmark, one sixth larger than Ireland, twice the size of Nova Scotia, one third larger than New Brunswick, and almost equal to the State of New York.

Topography.—Newfoundland is roughly triangular in shape, with a rugged, rocky, precipitous coast line of about 6,000 miles, broken up in a remarkable manner by broad and deep bays, harbors, fiords, and inlets, particularly on the southeast and south, many of them commodious and well sheltered, there being a safe harbor to nearly every ten miles of coast. Of the islands along the coast two belong to France, Saint Pierre and Miquelon (qq.v.). The interior of the island is greatly diversified by rivers and lakes, which occupy nearly a third of the area of the island; it presents many barren tracts, and is generally but thinly wooded except on the banks of the river; nevertheless there is much land suited for settlement and cultivation, and the forests as a whole are valuable. Hills and valleys continually succeed each other, the former never rising into mountains, and the latter rarely expanding into plains. The chief elevation is the Long Range, extending northeast from Cape Ray for 200 miles to the Petit Nord Peninsula, its principal summits reaching a height of 2,000 feet.

Hydrography.—Some of the numerous lakes and rivers are of considerable size, the largest of the latter being the Exploits and the Humber rivers, both issuing, like all the other streams in the island, from lakes or ponds in the interior. The largest lake is Grand Lake, from 50 to 60 miles long and five miles broad; the next in dimensions is Red Indian Lake, 30 miles long and from five to six miles broad.

Geology and Mineral Resources.—The prevalent formation is granite, and in some parts porphyry, quartz, gneiss, mica, and clay-slate, with secondary formations. The minerals comprise coal, gypsum, copper, lead, nickel, silver, iron and gold. Coal is found in two basins, one near the southwestern extremity of the island, the other in the interior to the north of Grand Pond. Copper also exists in large quantities, and is worked to a considerable extent, Newfoundland producing a large proportion of the world's supply. Manganese also exists in extensive deposits.

Climate.—The climate, though severe, is healthful, the mortality among the inhabitants being lower than in most parts of the American continent, while in no other country is old age attended with greater bodily vigor and mental animation. Winter, which consists of a series of storms, of wind, rain, and snow, lasts from the beginning of December until the middle of April. January and February are the coldest months. Snow does not lie long on the ground, and the frost is less intense than in western Canada, though the thermometer frequently falls 30° below the freezing-point. The summer is short and warm.

Flora and Fauna.—The principal trees are pine, spruce, birch, larch, willow and mountain-ash, and lumbering has become an important industry. Recumbent and trailing evergreens are met with in great variety, and the berry-bearing shrubs clothe every swamp and open tract. European and American grasses of various kinds abound, as also natural red and white clover and vetches. The plains abound with herds of caribou deer; these with bears, wolves, foxes, beavers, and hares, form the principal fauna of the island, which has become a favorite resort for sportsmen. The pure breed of Newfoundland dogs, so much celebrated for their size, sagacity, and fidelity, is now rarely to be met with. Birds are numerous, both land and aquatic.

Agriculture.—Much of the soil, especially in the south, is unproductive. Where adapted for cultivation, agriculture employs a large portion of the inhabitants; the crops generally are abundant, particularly potatoes. Grain crops also thrive well, wheat having yielded as high as 50 bushels per acre; but both climate and soil are perhaps more favorable to pasturage and green crops than to grain. Dairy farming is receiving increasing attention. In the valleys on the western coast are large tracts, now almost unoccupied, capable of being converted into productive grazing and arable land, but awaiting increased facilities of communication.

Fisheries.—The famous banks of Newfoundland swarm with almost every variety of fish, particularly cod. These banks consist of an extensive submarine elevation, formed by Arctic

deposits from melting icebergs, in its full extent occupying 16° of longitude and nearly 10° of latitude, being between 600 and 700 miles in length, with a depth of water varying from 4 to 160 fathoms, 40 fathoms being the mean. The shores of Newfoundland, however, equally abound with cod as the banks, and are preferred by the natives generally as fishing-grounds, seal being also numerous on the coasts, with grampuses and porpoises. In summer large numbers of Newfoundland fishermen transfer their activity to the coasts of Labrador. The cod fishery may be said to form the staple occupation of the inhabitants. The seal-fishery is next in importance. Herring also are caught, and the canning of lobsters is an increasing industry.

Commerce, Communications, etc.—The exports from Newfoundland during the last few years have averaged about $7,500,000 annually, the imports $6,160,000. The value of cod, lobsters, and herrings, exported in a recent year, was about $3,550,000. Woolens, cottons, flour, and iron are the chief imports. The local shipping register in 1901 comprised 2,634 vessels with a total of 107,168 tons, 47 of 9,392 tons aggregate being steamers, the rest sailing vessels. The total tonnage of vessels entered and cleared at Newfoundland ports in 1900 was 1,408,293 tons, of which 980,029 were British. A railway right across the island from Saint John's has been open for traffic since 1897. Its total length is 484 miles, or including its branches about 638 miles. There are over 1,300 miles of telegraph lines, and two trans-oceanic cables land in Newfoundland.

Government.—Repeated attempts have been made, but unsuccessfully, to include Newfoundland in the Canadian confederacy. Its affairs are administered by a governor appointed by the British home government, an executive council of 9 members, a legislative council of 15 members nominated by the governor, and a legislative assembly of 36 representatives elected by universal manhood suffrage. The revenue in 1901 was $1,953,720, the expenditure $1,952,748; the island has suffered from periods of severe financial depression, and the public debt is $16,891,900. The dollar is the unit of currency.

Population.—In 1901 the population of Newfoundland was 217,037, of its dependency Labrador 3,947. The inhabitants are chiefly of Anglo-Saxon and Gaelic descent; there are a few Mic-Mac Indians, but the aboriginal natives, the Beothiks, a numerous and powerful race when Cabot discovered the island in 1497, had died out by 1828. Saint John's (q.v.), on the east coast, is the capital, other urban centres are Bonavista, Carbonear, Harbor Grace, and Twillingate.

Education and Religion.—Education is denominational and non-compulsory; elementary schools have been established throughout the 18 electoral districts into which the colony is divided, and are well attended. The Roman Catholics are the most numerous religious sect, the Anglicans next and the Wesleyans third. There are four public academies in Saint John's — one Roman Catholic, one Anglican, one Wesleyan, and one for other denominations. There are also Roman Catholic and Protestant colleges affiliated with London University.

History.—Newfoundland was visited by Norwegians or Northmen about the year 1000, but was practically discovered by John Cabot 24 June 1497. Soon after Portuguese, Basques, and Spaniards established fisheries on its shores. In 1583 Sir Humphrey Gilbert took formal possession of the island for Queen Elizabeth, and English colonies were gradually established along the east coast, and several French along the south. In 1713 Newfoundland and its dependencies were declared by the Treaty of Utrecht to belong wholly to Great Britain; the French reserving a right to fish and cure on parts of the coast, called the «French Shore,» extending from Cape Saint John on the east to Cape Ray on the southwest. This arrangement has been the source of frequent disputes, the French now claiming exclusive rights, against which the islanders energetically protest. The position maintained by the French has prevented the development of the «French Shore,» and the mineral resources of the adjacent country, while the procrastination of the British government to the repeated requests of the Newfoundlanders to settle the matter conclusively has led to the avowed intention of influential natives to appeal to the United States for annexation, a parallel for this action being the case of Texas in 1845. In March 1890 a *modus vivendi* was concluded between the French and British governments, remaining in force till 31 Dec. 1900. A Royal Commission, appointed in August 1898, decided that part of the French claims should be removed by purchase or concession; that the lobster fisheries should be arranged on the same basis; that the French should be furnished free bait, on abandonment of their bounties (to expire in 1901); that they should be prohibited from interfering with the «Treaty Shore,» and that smuggling should be suppressed. On the outbreak of the war in South Africa, the colony on its own initiative renewed the *modus vivendi*, in order to relieve the home government and to prove its loyalty. Pending a definite settlement the *modus vivendi* has been renewed annually. Consult: Harvey, 'Newfoundland, England's Oldest Colony' (1897), and 'Newfoundland in 1900'; Prowse, 'History of Newfoundland' (1897); Smith, 'The Story of Newfoundland' (1901); Wilson, 'The Truth About Newfoundland' (1901).

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Newfoundland Dog, a large, handsome, long-haired, water-loving dog, originating in Newfoundland, probably from a cross between the native Indian sledge-dog and early imported European dogs, especially the pointer. The breed showed extraordinary retrieving powers, and was sent to Europe in so large numbers, and at so high prices, that it long ago became almost extinct in Newfoundland. It has, however, been maintained pure by various breeding kennels both in Great Britain and the United States. For standard of points see DOG.

Newgate, nū'gāt, London, a historic prison, built in the 13th century, at the west end of Newgate Street. In the 15th century Sir Richard Whittington left funds to rebuild it; it was rebuilt a second time after the great fire of 1666, and a third time after the No Popery riots of 1780. It is described by Dickens in 'Barnaby Rudge.' It was finally demolished in 1902–3 to be replaced by the Central Sessions building. Consult Griffiths, 'Chronicles of Newgate' (1884).

Newhall, nū'hâl, **Charles Stedman,** American author: b. Boston, Mass., 4 Oct. 1842. He was graduated at Amherst in 1869 after serving in the Civil War and studied theology. He officiated as a clergyman for a time and later as a college professor, but became United States assistant special forest agent and is now (1904) superintendent of the forest reserves of northern and central California. He has written: 'History of Fall River' (1862); 'Ruthie's Story' (1888); 'Vines of Northeastern America' (1897); 'Fire and the U. S. Reserves' (1902); etc.

Newman, nū'man, **Albert Henry,** American Baptist clergyman and educator: b. Edgefield County, S. C., 25 Aug. 1852. He was graduated from Mercer University, Ga., in 1871, and from the Rochester Theological Seminary in 1875. He became a college professor, and in 1881–1901 filled the chair of church history at McMaster University, Toronto, Ont., and since 1901 has held a professorship at Baylor University, Waco, Texas. He has written: 'The Baptist Churches in the United States' (1894); 'A Century of Baptist Achievement' (1901); etc.

Newman, Francis, English colonial governor in America: b. England about 1600; d. New Haven, Conn., 16 Nov. 1660. He emigrated to New Hampshire in 1638, settled later in New Haven and was one of the committee which waited upon Peter Stuyvesant to adjust the boundary question. In 1658 he became governor of the united colonies, which office he held until his death.

Newman, Francis William, English scholar: b. London 27 June 1805; d. Weston-super-Mare, Somerset, 4 Oct. 1897. He was graduated from Worcester College, Oxford, in 1826; was fellow of Balliol in 1826–30; became professor of classical literature in Manchester New College in 1840; was professor of Latin at University College, London, in 1846–69, and was made principal of University Hall, London, in 1848. A brother of Cardinal Newman (q.v.), the thought and faith of the two wholly diverged. Francis made important contributions to the religious ideas of his time. His 'Phases of Faith' (1850), an autobiographical narrative of his religious changes, excited much controversy and was undoubtedly his best known writing; but 'The Soul: Its Sorrows and Aspirations' (1849) shows him at his best. In 1876 he joined the British and Foreign Unitarian Association, of which he became vice-president in 1879. His further writings are varied, treating of education, politics, religion, and social questions. An interesting experiment was his 'Hiawatha Translated into Latin' (1862).

Newman, Henry Roderick, American painter: b. New York 1833. He was intended for a physician, but abandoned medicine for art in his 18th year. Going to France in 1870 he made a tour of Switzerland and proceeded to Venice (1871), but eventually settled in Florence. He is pre-eminently a water color painter and his works consist principally of landscapes, and architectural views, among which may be mentioned 'Venice'; 'Tuscan Spring'; 'The Cathedral at Florence'; 'An Architectural Study.' He has also produced some clever flower and fruit pieces, including: 'A Study of Pink and White Oleanders'; 'Grapes and Olives'; and 'Flowers.'

Newman, John Henry, Cardinal Deacon of the Roman Catholic Church, English religious leader and ecclesiastic: b. London 21 Feb. 1801; d. Edgbaston, near Birmingham Warwickshire, 11 Aug. 1890. With Newman, one of the most remarkable figures in the latter-day history of Christianity, religious impressions were early, and in 1816 he experienced that inward conversion, of which he wrote in the 'Apologia' "I am still more certain than that I have hands or feet." He read much religious literature, largely Calvinistic, and through Thomas Newton's 'Dissertations on the Prophecies' was thoroughly convinced as to the identity of the Pope with the Scriptural Antichrist. Having been entered at Trinity, Oxford, in 1816, he went into residence in 1817, in 1818 gained a Trinity scholarship of £60, tenable for 9 years, was graduated B.A. in 1820, and remained at Oxford receiving private pupils. In 1822 he was elected to a fellowship of Oriel, then the centre of Oxford intellect, and on Trinity Sunday (13 June 1824) was ordained deacon. He became curate of St. Clement's, Oxford, and did hard work in the parish. For 19 years he continued an Anglican clergyman. Edward Hawkins, the vicar of St. Mary's, Oxford, and a fellow of Oriel, did much to "root out evangelical doctrines" from Newman's mind. There was one other at Oxford to whom Newman owed much more, he said, "in the way of mental improvement" than to any else. This was Whately, principal of St. Alban Hall, to whose vice-principalship Newman was elected in 1825. Newman had a share in the preparation of Whately's 'Logic,' and obtained from him the idea of the Church as a divinely appointed organization, free from state control. In 1826 he resigned his post as vice-principal and the curacy of St. Clement's upon his appointment as tutor of Oriel, and on Hawkins' election to be provost of the college in 1828 was instituted to the vicariate of St. Mary's thus vacated. From this time he began to take his position as a leader at Oxford. Hawkins had introduced a Sunday afternoon service at four, which Newman continued and, by his sermons, made famous. Matthew Arnold has described the preacher, "breaking the silence with words and thoughts which were a religious music, subtle, sweet, mournful." In 1830 he was dismissed from the local secretaryship of the Church Missionary Society because of the publication of a pamphlet expressing dissatisfaction with the constitution. Later in the year he withdrew from the Bible Society, and his severance from the Evangelical or Low Church party was complete. He resigned his tutorship in 1832, because of long-standing differences with Hawkins arising from Newman's view of his office as "substantially religious." Then in 1832–3 he was on a Mediterranean tour with R. H. Froude, fellow of Oriel, during which he found the religion of Rome "polytheistic, degrading, and idolatrous," and wrote the world-famous hymn 'Lead, Kindly Light.' On 9 July he reached England, and on 14 July Keble preached at St. Mary's the assize sermon on 'National Apostasy,' which Newman regarded as the "start of the religious movement of 1833." Dean Church says of the Oxford movement, that the inspiration was Keble's, the impetus Froude's; and that

Newman "took up the work." Newman, apparently on his own initiative, began in September the 'Tracts for the Times,' whence the name Tractarian. He was editor in 1838–41 of the 'British Critic,' the principal organ of the movement, and he lectured in Adam de Brome's chapel of St. Mary's in defense of Anglo-Catholicism as the *via media* between Romanism and popular Protestantism. The testimony of contemporaries is unanimous that at this time Newman's influence was the most significant fact at Oxford. In 1841 he published 'Tract 90,' in which he argued that the XXXIX. articles did not oppose Catholic teaching, but were chiefly directed against the errors and exaggerations of Rome. The tract was generally received with unconcealed indignation, and the bishop of Oxford caused the series to be stopped. Newman had already been "seriously alarmed" as to the Anglican position. The "three blows which broke me" were charges against him by the bishops, the conviction that semi-Arianism in the Arian controversy was parallel with Anglicanism, and the evidence of the non-apostolic nature of the Church of England in the negotiations for a Jerusalem bishopric, appointment to be made alternately by Great Britain and Protestant Prussia. In 1842 he retired to Littlemore, and there, with a small community of followers, lived in fasting, prayer, and seclusion. In February he formally retracted in the 'Conservative Journal' the "hard things" said of Rome, on 18 September resigned the living of St. Mary's, and on 9 October was received into the Roman Catholic Church. He then left Oxford for 32 years, went to Rome, where he was ordained priest and made doctor of divinity (1846), and in 1847 founded at Birmingham an oratory of St. Philip Neri. In 1854–8 he was rector of the newly inaugurated Catholic university at Dublin, in 1859 established at Edgbaston a high-class Catholic school, in 1877 was elected honorary fellow of Trinity, Oxford, and in 1879 was created cardinal deacon of the Holy Roman Church of the title of St. George in Velabro. He was opposed to the opportuneness of the definition of papal infallibility. The chief event of his Catholic years came about through an article by the Rev. Charles Kingsley, professor of modern history in Cambridge, in 'Macmillan's' for January 1864. Kingsley asserted that Newman had said that truth "need not, and on the whole ought not, to be" a virtue of the Roman clergy. On consecutive Thursdays between 21 April and 2 June (appendix 16 June), Newman published the 'Apologia pro Vita Sua,' that remarkable history of his religious opinions, which established himself in universal reverence in England, with not a further doubt as to his splendid integrity.

It is evident that the path to Rome was for Newman a long one. For two years of searching doubt he preached as an Anglican, and for two more remained in silence and undecided. But so satisfactory to himself had been the process of change, that after his submission he appears not for a moment to have questioned its wisdom. For the Church of England his step was a blow to the severity of which Beaconsfield and Gladstone have testified. For the Roman Catholic Church it was "the greatest triumph . . . in England during 300 years." Some of the "movement" followed him, but most of the old school remained within the Establishment. Whatever may be thought of the conclusions arrived at by him, it remains true that he discussed the great controversy with singular acuteness and an impressive calm. His mind was Hebraic in being wholly directed by a consciousness of the Deity. But it was also Hellenic, in its expression,— the subtlety of its logic, the sense of verbal distinctions,— in the finesse of which he was so careful as to restrict his influence and to be reproached by some. Of the literary school originating with him, Matthew Arnold is probably the chief example. Many of his writings were adapted to only temporary ends, and will not live except for the special student. But critics think permanent many of his sermons, the 'Apologia,' the 'Verses on Various Occasions' (1868), and his longest poetical work, 'The Dream of Gerontius' (1865–6), "generally recognized," says A. W. Hutton, "as the happiest effort to represent the unseen world that has been made since the time of Dante." Consult: The 'Apologia'; the 'Letters and Correspondence' (1891); Pattison, 'Memoirs' (1885); Church, 'The Oxford Movement' (1891); Hutton (R. H.), 'Cardinal Newman' (2d ed. 1891); Abbott, 'The Anglican Career of Cardinal Newman' (1892); Waller and Barrow, 'John Henry, Cardinal Newman' (1901; 'Westminster' biographies); and the biography by Whyte (1903).

Newman, John Philip, American Methodist bishop: b. New York 1 Sept. 1826; d. Saratoga, N. Y., 5 July 1899. He studied for the ministry and in 1860 was ordained. He preached in New Orleans in 1864–9; in 1869–72 and in 1875–8 was pastor of the Metropolitan Methodist Church in Washington, D. C., and was chaplain of the Senate for three sessions. He was appointed by President Grant inspector of United States consulates in Asia in 1873, and in 1888 was elected bishop. He wrote: 'From Dan to Beersheba' (1864); 'Christianity Triumphant' (1884); 'The Supremacy of the Law' (1890); 'Conversations with Christ' (1901).

Newmarket, nū-mär'kĕt, Canada, town in York County, in the Province of Ontario; on the Grand Trunk railroad; about 35 miles north of Toronto. It is in a region largely devoted to farming, and its industries are connected chiefly with agricultural products and the shipment of live-stock. Pop. (1891) 2,143; (1901) 2,125.

Newmarket Race-course. See HORSE-RACING.

Newnan, nū'nan, Ga., city, county-seat of Coweta County; on the Central of Georgia and the Atlanta & W. P. R.R.'s; about 38 miles south by west of Atlanta. It is in a productive agricultural region in which cotton and fruits are extensively cultivated. The principal industrial establishments are cotton mills, cottonseed-oil mills, machine shops, flour mill, tannery, fertilizer works, a large plant for manufacturing boilers, engines, presses, and mill machinery, and an ice factory. A good quality of wine is made from the grapes which grow in the vicinity, and a considerable amount of fruit is canned for foreign markets. The city owns the waterworks. Pop. (1890) 2,859; (1900) 3,654.

Newnes, nūnz, SIR **George,** English journalist: b. England 13 March 1851. He was educated in the City of London School and entered journalism. He is proprietor of the

Westminster Gazette and founder of "George Newnes, Limited," publishers, and proprietors of 'Strand Magazine,' 'Tid-Bits,' etc. He was knighted in 1895, and since 1900 has been a member of Parliament for Swansea Town.

Newnham (nūn'ăm) **College,** England, an institution for the higher education of women at Cambridge, founded in 1871, and incorporated in 1880. No students are admitted under 18 years of age; the course of study corresponds with that of Cambridge University. There are a number of exhibitions and scholarships connected with the college, which is on the same lines as Girton (q.v.). The faculty numbers about fifteen, and there is an average attendance of over 160 students.

New'pore, Fort, a former Revolutionary fortification on Ward Creek, near Oneida Lake, New York.

Newport, nū'pōrt, **Christopher,** English sea captain: b. about 1565; d. 1618. In 1592 he commanded a ship in the West Indian expedition; sailed to Virginia in 1606, 1607 and 1609; was wrecked on the Bermudas in the latter voyage, but made his way to Virginia after many adventures recounted by Jourdain in the 'Discovery of the Bermudas,' which Shakespeare may have used in writing the 'Tempest'; and in 1612 entered the employ of the East India Company, for whom he made several very successful voyages.

Newport, George, English naturalist: b. Canterbury, England, 4 July 1803; d. London, England, 7 April 1854. He was educated at the London University and became a surgeon, but devoted much time to entomology, in which science he made valuable discoveries. He wrote: 'Observations on the Anatomy, Habits, and Economy of Athalia Centifolia' (1830); 'Catalogue of the Myriapoda in the British Museum' (1856); etc.

Newport, England, a town of Monmouthshire, on the Usk, 145 miles by rail west of London. It is an important river port communicating with the Bristol Channel. As one of the principal outlets for the produce of extensive collieries and iron and steel works in the vicinity, it has extensive dock accommodation covering over 80 acres. Its public buildings are all of modern erection, and include town hall, market hall, county offices, public baths, museum, and art gallery. Its most ancient buildings are the remains of a 12th century castle and the church of Saint Woollos. Pop. (1901) 67,290.

Newport, Ky., city in Campbell County; at the confluence of the Ohio and Licking rivers; and on the Louisville & N. and the Chesapeake & O. R.R.'s. Cincinnati, on the Ohio, and Covington, on the Licking, are opposite Newport. The city was settled in 1791; in 1795 was incorporated, and, in 1850, was granted a city charter. It is a popular residential city for Cincinnati business men. It is in an agricultural region and farm products are among its most important shipments. The chief manufacturing establishments are cigar-box factory, cast and sheet iron works, carriage works, watch-case factory, and a furniture factory. It has large coal and brick yards and considerable river trade. Fort Thomas, a government military post, is on an elevation near the city. Some of the prominent buildings are the city-hall, courthouse, post-office, the banks, a Masonic Temple, the churches and schools, and the library. It is the seat of Mount Saint Martin's and Immaculate academies, and it has good public and parish schools and a public library.

The government is administered under a charter of 1894, which provides for a mayor who holds office for four years, and a council. The mayor appoints the police and firemen and the members of the water commission, and, subject to the approval of the aldermen, the superintendent of public works and the city auditor. The council elects the bridge commissioners. The board of education is elected by the people, and the members hold office two years. The waterworks is owned and operated by the municipality. Pop. (1890) 24,918; (1900) 28,301.

Newport, N. H., town, county-seat of Sullivan County; on the Sugar River, and on the Boston & Maine railroad; about 35 miles in direct line northwest of Concord and 45 miles northwest of Manchester. It is in an agricultural and grazing region, and the good waterpower contributes to its industrial prosperity. Its chief manufactures are woolen goods, agricultural implements, shoes, lumber and lumber products, clothing, and dairy products. It has a public library which contains (1904) about 8,000 volumes. Its scenery and climate make it a favorite summer resort. The city owns and operates the waterworks. Pop. (1890) 2,623; (1900) 3,126. Consult: Wheeler, 'The History of Newport'

Newport, R. I., city, port of entry, county-seat of Newport County; in Rhode Island, on Narragansett Bay, and on the New York, N. H. & H. R.R.; about 30 miles south of Providence. It has daily steamer communications with Providence, New York, Fall River, and other ports. It is a famous summer resort, and in the season its facilities for transportation are much increased. Its beautiful scenery, equable climate, ease of access by land and water from New York, Boston, and other large cities, make it a favorite watering place. Its occupancy by people of great wealth, who have built summer residences costing millions of dollars, has made it fashionable and exclusive. In 1639 Newport was settled by Roger Williams, and later Anne Hutchinson and other refugees, who for religious convictions had been expelled from Massachusetts by the Puritans,. came to Newport. At first Newport was independent in government, but in 1644 Roger Williams obtained a patent from the British Parliament under which all the colonies in what is now the State of Rhode Island were united under the name of "The Incorporation of Providence Plantations in the Narragansett Bay in New England." The charter gave much dissatisfaction and in 1663 was changed to a charter that continued in force until 1843. (See DORR REBELLION.) A public school was established in Newport in 1840. From the beginning the place was a trading port of importance; its commerce was greater than that of New York in 1769–70. One of the first acts of resistance against Great Britain took place at Newport when the British sloop Liberty was destroyed here, while engaged in enforcing obnoxious smuggling laws. The British took possession of Newport 6 Dec. 1776, and held it for two years. The shipping of

the place and the general trade were nearly destroyed during the Revolution. The British soldiers burned in all about 475 houses. In 1780 Rochambeau and his troops from France made Newport their headquarters. In 1784, the year after the Revolutionary War had closed, Newport was incorporated; but in 1786 it surrendered its charter, and was not re-incorporated for 77 years.

It is claimed by some historians that Newport, and other parts of the United States, were discovered by Northmen as early as the 11th century. The "Old Stone Mill" in Touro Park is pointed out as a relic of the days of the Northmen; but it is now generally believed that this mill was built in the 17th century. Newport was one of the capitals of the State until 1900. Bishop Berkeley lived in Newport from 1729 to 1732 and here wrote his ode on Western progress, and part of his 'Alciphron.' William Ellery Channing and Commodore M. C. Perry were born in Newport. Some of the historic places are the State House built in 1742; the city-hall built in 1763; Redwood library, 1748; Trinity Church (P. E.), 1725; the headquarters of the British Army (Sayer House), in 1780. One of the oldest newspapers in the United States still in existence, is the Newport *Mercury*, established by James Franklin in 1758. The oldest part of the city is around the harbor; the modern part, with its magnificent mansions, surrounded by well-kept lawns, is toward the ocean. Overlooking and guarding the harbor are Fort Greble and Fort Adam. Some of the attractions other than those mentioned are the long beaches, the bathing places, the "Hanging Rocks," the 12-mile Ocean Drive, Purgatory (a rocky fissure 50 feet in depth), the Cliff Walk, and the Spouting Rock (when the water is disturbed by a storm it is forced through an opening in this rock). It has a United States torpedo station on Goat Island, and a United States Naval Training Station and War College on Coaster Harbor, also a naval hospital (1897). The city has many parks, fountains, and monuments which are works of art. It is the seat of Saint George's and Cloyne House schools and Saint Mary's Academy. A valuable collection of relics are in the Newport Historical Society building; there are several libraries, the People's, Redwood, and others.

It still has a large fish trade, but the city is now known for its society life, and its industries and commerce are of little value. Pop. (1890), 19,457; (1900), 22,034. Consult: Brooks, 'The Controversy Touching the Stone Mill'; Greene, 'The Providence Plantation'; 'Newport in the Revolution,' an article in the 'New England Magazine.'

Newport, Vt., village, county-seat of Orleans County; on Lake Memphremagog, and on the Boston & Maine and the Canadian Pacific R.R.'s; about 50 miles in direct line north by east of Montpelier. In the summer season it has regular steamer communication with all the villages and towns on the lake. It is a favorite summer resort on account of its climate, the scenery in the vicinity and the opportunities for fishing. Its trade is chiefly in farm products; its manufactures are principally to supply local wants. It has fine church and school buildings and the Goodrich Memorial Library which contains (1904) about 7,000 volumes. Pop. (1890) 1,730; (1900) 1874.

Newport News, Va., city and port of entry in Warwick County, on the James River and Hampton Roads, and at the terminus of the Chesapeake & Ohio railroad; situated 70 miles southeast of Richmond and 14 miles north of Norfolk. The city lies in the centre of a rich vegetable and fruit country. It is connected with Hampton and Old Point Comfort by electric railways. In the heart of the city facing the James River is Casino Park, which has become a popular resort.

Trade and Commerce.— With several foreign and coast lines of steamships sailing hence, and with a fine harbor and excellent shipping facilities, Newport News has very recently become an important port and the centre of large commercial interests. The foreign trade in 1901 amounted to $36,658,000; the exports amounting to $32,568,000. The foreign commerce of the port is largely carried on by the Chesapeake & Ohio Railroad and the United States Shipping Company, making direct connection with England and the continent. The city has become fourth in the United States in the shipment of grain. There are two national banks, each with a capital of $100,000; six private banks, and several trust companies. The city has three weekly and four daily newspapers.

Manufactures.—Here is an extensive shipbuilding plant, giving employment to 7,000 workmen; two dry docks 600 and 900 feet long; two grain elevators with a capacity of 2,850,000 bushels; wood-working mills; ice factories, lumber mills, iron works, shoe factory, shirt factory, and brewery.

Government.— Newport News is governed, under its original charter of 1896, by a mayor, elected every four years, a common council, consisting of 16 members, and a board of eight aldermen. The city has an improved system of waterworks and electric light and gas plants.

Population.— Newport News is a young town practically lacking in history. It was first laid out in 1882 and incorporated in 1896. Its growth has been very rapid; the population in 1890 was 4,449; in 1900 it was 19,500, and 1903 25,000.

F. J. KING,
Secretary Newport News Chamber of Commerce.

News-Letter, a popular name applied to the printed sheets or letters issued weekly in the early part of the 17th century, the news for which was collected in the coffee houses. Originally they were literally letters of news written by professional newswriters, and sent by them to their employers weekly. Many early printed newpapers took News-Letter as a title, as the 'Boston Newsletter,' etc.

Newspaper, a daily or other printed paper containing news or intelligence of past, current, or coming events, together with comment, criticism, or discussion of such events by editors and contributors. The total number of newspapers published in the world at present is estimated at about 60,000, distributed as follows: United States and Canada, 26,360; Germany, 8,000; Great Britain, 8,000; France, 4,300; Japan, 2,000; Italy, 1,500; Austria-Hungary, 1,200; Asia (exclusive of Japan), 1,000; Spain, 850; Russia, 800; Australia, 1,000; Greece, 600; Switzerland, 450; Holland, 300; Belgium, 300;

all others, 1,000. Of these more than half are printed in the English language. A detailed history of the newspaper in America will be found under AMERICAN NEWSPAPERS.

Early Roman Bulletins.—The newspaper had its origin several centuries before the Christian era. The Romans published The 'Acta Diurna', the 'Acta Publica', the 'Acta Senatus' and other journals. The 'Acta Diurna' was a bulletin in which accounts were given of the progress of the imperial arms. The intelligence was communicated by the generals who received it from the officers under their command, and thus the contents became known throughout the army. The 'Acta Diurna', however, recorded other than military matters, such as trials, punishments, deaths, and sacrifices. The 'Acta Senatus' contained accounts of the various matters brought before the senate, the opinions of the chief speakers, and the decisions of the house, published regularly by command of Julius Cæsar, as part of the government gazette. The 'Acta Publica' was a still nearer approach to the true newspaper form. During the later times of the republic, and under the empire, it was published daily at Rome by the authority of the government. It contained a register of the births and deaths in the city; an account of the money paid into the treasury, from the provinces, and everything relating to the supply of corn, and a kind of court circular, containing an account of the births, deaths, festivals, and movements of the imperial family. Such details of public affairs as it was deemed expedient to publish were also included in it. The speeches in the senate and the public assemblies were taken down by the early Roman short-hand writers called *actuarii*. These, assisted by clerks and notaries, drew up the 'Acta,' under the superintendence of censors, quæstors, and other magistrates. The publication consisted in posting them in some public place, that any one who pleased might read them.

First Printed Journals.—The Peking *Gazette* was probably the first printed newspaper, and is the oldest daily journal in the world. It was first issued about 1340 A.D. The *Gazette* is still in existence, and is an official journal, forming a pamphlet of 20 to 40 pages of coarse paper, printed from wooden types on one side only, and having a colored paper cover. Toward the close of the 15th century, soon after the invention of printing, small sheets, usually in the epistolary form, appeared in Augsburg, Vienna, Ratisbon, and Nuremberg. They were called 'Relationen' and the 'Newe Zeytung', and gave accounts of the discovery of America and of other important public events, and like modern newspapers they chronicled the more interesting and startling local incidents. The 'Notizie Scritte', published monthly in Venice, in 1562, is said to have been the first Italian newspaper. Its price was a small coin called gazetta; hence the word gazette which came to be the popular name for the modern newspaper. The war which Venice waged in Dalmatia gave rise in 1563 to the custom in Venice of having military and commercial information read at a particular place by those desirous to learn the news, who paid for this privilege. A file of these Venetian papers, covering a period of 60 years, is still preserved in the Magliabecchi Library at Florence.

English Newspapers.—A printed bulletin entitled 'Relations' was published in England as early as 1462, and in 1527 there was one called 'New Tidings', but neither of these presented more than a single piece of intelligence. A pamphlet called 'The Newes from Spaine' made its appearance in the reign of Queen Elizabeth in order to convey to the people the tidings of the approaching armada from Spain, and the various counter-movements on the part of the British army and fleet. A more pretentious journal was issued in 1622, under the title, 'The Weekly News from Italy, Germany, etc.,' published by Nathaniel Butter, Nicholas Bourne, and Thomas Archer, and this may be regarded as the first specimen of the regular newspaper in England. Numerous other news journals followed, but it was not till the beginning of the parliamentary wars that the newspaper first acquired political influence. One of these, published in November 1641, under the title of 'Diurnal Occurrences, or the Heads of Several Proceedings in both Houses of Parliament,' is noticeable as the first which furnished a report of the proceedings in Parliament. The other papers which followed this were the 'English Post,' 'England's Memorable Accidents,' 'The Kingdom's Weekly Intelligencer,' 'The Spy,' 'The Parliament's Scout,' 'The London Post,' 'The Country Messenger,' and were most of them published weekly. In Cromwell's time the principal journals were the 'Mercurius Politicus' and the 'Public Intelligencer.' The publication of newspapers without license was prohibited in the reign of Charles II., and an office was created called Licenser of the Press. Advertisements first appeared in English newspapers in 1652. The first copy of the 'London Gazette' was issued 7 Nov. 1665, at Oxford, whither the court had retired in consequence of the plague then raging in London. It has since been uninterruptedly published twice a week as an official court circular. The first London daily paper was published in 1709 under the name of the *Daily Courant*. At this time appeared Defoe's journal, the 'Review.' The first number of the 'Tatler' was published on 23 April 1709, and of the 'Spectator' on 1 March 1711. Though not properly newspapers in the modern sense of the term, their early numbers contained general news in addition to their other literary matter. In 1712 a tax or stamp-duty was imposed by the government of a half-penny on papers of half a sheet or less, and a penny on papers of a single and above half a sheet. The London *Daily Advertiser* first appeared in 1726, and became afterward celebrated by the publication of the famous 'Letters of Junius.' The *Morning Chronicle* appeared in 1769, and the *Morning Post* in 1772. The *Times* was first commenced 18 Jan. 1785, under the name of the London *Daily Universal Register*, which was afterward superseded by that of the *Times* on 1 Jan. 1788. It was ably conducted from the first by Mr. Walter, who in 1803 transferred the management to his son. The *Daily News* appeared in 1846, the *Daily Telegraph* in 1855, and the *Daily Standard* in 1857. Others of later establishment are the *Echo, Graphic, Mail, Pall Mall Gazette, Westminster Gazette,* etc.

The provincial English press began with the Norwich *Postman,* published in 1706, and followed by the Norwich *Courant* in 1714, and the 'Weekly Mercury, or Protestant's Packet' (at Norwich) in 1720. The 'Worcester Postman' appeared in 1708, the Newcastle *Courant* in 1711, the Kentish *Post* in 1717, and the Leeds *Mercury* in 1718.

Ireland and Scotland.—The first newspaper published in Ireland was the Dublin *News-Letter,* in 1685, followed by the Dublin *Intelligencer* in 1690. The Belfast *News-Letter,* still flourishing, first appeared in 1737. The 'Freeman's Journal' commenced in 1763. In Scotland on 31 Dec. 1660, appeared at Edinburgh the first number of the 'Mercurius Caledonius,' which had an existence of only three months. The Edinburgh *Evening Courant* was started in 1718. The *Caledonian Mercury* commenced in 1720 and existed 150 years. The Edinburgh *Gazette* dates from 1699. The first paper published in Glasgow was the Glasgow *Courant,* on 11 Nov. 1715, followed by the Glasgow *Journal* in 1729. The Edinburgh *Scotsman* was first issued in 1817, and the Glasgow *Herald* in 1782.

France.—The first French newspaper, *The Gazette de France,* appeared in 1631, edited by Theophraste Renaudot, a physician, who had been in the habit for some time previously of presenting to his patients a printed account of the various occurrences of the day. The *Gazette* had a most successful career and existed until 24 Aug. 1848, when it was suspended. Two weeks later it was resumed under the title of *Le Peuple Francais,* which title was again altered to *L'Etoile de la France.* The *Gazette Burlesque,* a newspaper in verse, was commenced in 1650, under the management of the poet Jean Loret. The *Mercure Galant* was started by Donneau de Visé in 1672, and under the title of the *Mercure de France,* to which it was changed in 1717, continued to exist until 1853. After the Revolution a host of new papers appeared. Among these were the *Chronique de Paris,* the *Orateur du Peuple,* Hebert's *Père Duchesne,* and *Ami du Peuple.* Of all the newspapers, however, commenced at this eventful period, the only ones which have survived are the *Journal des Débats* and the *Moniteur.* Under Napoleon the press was subjected to a rigid censorship, which was continued until 1819. During the reign of Louis Philippe appeared *La Presse* and *Le Siècle,* both of which commenced in 1836. Since that date the growth of the newspaper press in Paris has been rapid. In 1903 over 1,400 newspapers were regularly published in Paris alone, some 60 of these being daily political organs. The most important of all is the *Temps,* with politics of moderate republicanism. *Le Petit Journal,* a cheap popular journal, has a circulation of over 1,000,000 daily.

Germany.—Egenolf Emmel, sometimes called the father of journalism, established at Frankfort in 1615 *Die Frankfurter Oberpostamtszeitung.* A second journal was commenced at Hildesheim in 1619, and a third at Herford in 1630. At the end of the 17th century there were at least 30 daily newspapers in Germany. The *Hamburgischer Correspondent* appeared in 1714 as a continuation of the *Holsteinische Zeitungscorrespondance,* established in 1712. It was the first German newspaper which received news of foreign affairs from correspondents resident abroad. The *Allgemeine Zeitung* was published in 1798, and soon rose to the highest position in German journalism. Other important journals are the *Norddeutsche Allgemeine Zeitung,* the *National Zeitung,* the *Neue Preussische Zeitung,* the *Volks-Zeitung,* the *Vossische Zeitung,* the *Kölnische Zeitung,* etc.

Russia.—The first journal in Russia appeared in 1703, and was followed by several others during the first half of the 18th century. The press in Russia is under very strict supervision, and thus naturally has but little influence in public affairs. The *Journal de St. Petersbourg,* in French, has a considerable circulation outside of Russia.

Holland and Belgium.—The pioneer newspaper of Holland was first published in 1656. The early Dutch newspapers were distinguished by the accuracy of the information furnished by them. It was not until 1830 that they began to comment on public occurrences, their criticism having been previously directed to items of commercial intelligence. The principal Dutch journals are the *Allgemeene Handelsblad* of Amsterdam, the *Haarlemsche Courant,* the *Journal de la Haye,* and *Staats-Courant,* the two latter published at The Hague. Among Belgian papers the *Indépendance Belge,* the *Journal de Bruxelles,* and the *Etoile Belge* are distinguished for the ability with which they are conducted.

Australia.—There are nearly 1,000 papers published in Australia. The daily issues are excellent imitations of the London newspapers. The Sydney *Gazette* was established in 1803.

India.—The first Indian newspaper in the English language appeared in Bengal in 1780. There are upward of 300 newspapers published in the various vernacular tongues.

In Turkey the first newspaper appeared in 1795 in French, and the first daily journal in Spain was published in 1704. The modern newspapers of Norway, Sweden, Denmark, Italy, South Africa, Switzerland, Portugal, Greece, China, Japan, and South and Central America, are of less importance than those of the other countries heretofore mentioned, being largely local in character.

WILL M. CLEMENS,
Editorial Staff, '*Encyclopedia Americana.*'

Newstead (nū'stĕd) **Abbey,** England, on the border of Sherwood Forest, 10 miles northwest of Nottingham, was an Augustinian Canons institution founded in 1170 by Henry II. in atonement for Becket's murder. In 1540, after the dissolution, it was given to Sir John Byron the Little, and is celebrated in connection with Lord Byron, the poet, who made the semi-ruinous edifice his home in 1808, but sold it in 1818. The abbey has since been restored, and has many carefully preserved relics of the poet. Consult: Irving, 'Abbotstord and Newstead.'

Newt, a small tailed batrachian of the genus *Diemyctylus, Triton,* or a related genus, but sometimes considered to constitute a distinct family, under the name *Pleurodelidæ.* Newts are sometimes also called elfs or tritons, and the name is often applied erroneously to salamanders of other genera not closely related. Among technical characteristics of the newts in general are the bony carpus and tarsus, the bony ball-and-socket joints of the vertebræ, and the nar-

row bands of palatine teeth. The species are more strictly aquatic than most salamanders, and the males of most species undergo remarkable seasonal changes in the development of high dorsal crests, papillæ, or other appendages on the arms and elsewhere, and of brilliant colors. About 20 species belonging to this group of genera are known, of which more than half are European, several Asiatic, and only two North American, while none have been found elsewhere. The eastern American species (*Diemyctylus viridescens*), of which a quite distinct variety occurs in Texas and Mexico, is abundant throughout the Eastern States, and extends into Canada. It may be distinguished by the rather narrow arched head marked with a pair of longitudinal keels, and the handsome greenish red color of the back, the pale yellow below, and the row of conspicuous scarlet, black-bordered spots on each side. In the adult stage just described this animal is about 3½ inches long and completely aquatic. A terrestrial form is somewhat smaller, lacks the dorsal crest altogether, has a rougher skin and a bright vermilion color. This is the pretty little creature common in eastern woods, which later returns to the water and assumes the greenish garb. Newts are chiefly nocturnal, and when abroad swim actively, not merely crawling on the bottom in the manner of most salamanders. They feed on all kinds of aquatic larvæ, worms, small mollusks, and crustaceans, and are very voracious. During the breeding season in the spring the male develops a broad cutaneous fin, richly provided with sense organs on the back and tail, and becomes otherwise modified. The fertilized eggs are deposited singly, each in a gelatinous capsule whose adhesive nature permits of their attachment to water-plants, some of the leaves of which are drawn about each egg. The larvæ are strictly aquatic and possess three pairs of external gills, but after metamorphosing, leave the water and assume the red terrestrial phase, when they live in the woods under stones and logs, appearing at night or during rain. This stage lasts for several years, when they seek the water either in the spring or fall and soon acquire the adult color and characteristics. Whether or not they can again enter the red phase by leaving the water is not certainly determined. Like frogs, newts swallow the skin after molting, which appears to take place most readily while the animal is immersed in water.

The Pacific newt (*Diemyctylus torosus*) is nearly twice as large, and is further distinguished by the wide, flat, keelless head, and brown, unspotted color. It is very abundant in California, and ranges from the southern part of that State to Alaska. Its habits are essentially similar to those of the eastern species. It feeds on earthworms, snails, slugs, insects, and its own sloughed skin, eggs and young. In this species the eggs are deposited in clumps.

The numerous European species present many interesting differences in detail in habits, especially in the mode of reproduction. Some of them live habitually away from the water and migrate long distances to it in the spring, and one species is remarkable from the fact that the ribs penetrate the skin. All of the newts make very interesting and satisfactory aquarium pets.

J. Percy Moore,
University of Pennsylvania.

Newton, nū'tŏn, **Alfred,** English ornithologist and zoologist: b. Geneva 11 June 1829. He was educated at Magdalene College, Cambridge, of which he was traveling fellow 1854–63, fellow in 1877, and now (1904) is professor of zoology and comparative anatomy. He took a prominent part in urging bird protection by legislation; traveled in Lapland, Iceland, West Indies, North America, and Spitzbergen; edited 'The Ibis' (1865–70) and the 'Zoological Record' (1870–2); contributed the erudite and able ornithological articles to the 9th edition of the 'Encyclopædia Britannica'; and greatly advanced the study of the comparative anatomy of birds. He wrote 'The Zoology of Ancient Europe' (1862); 'Ootheca Woolleyana' (1864–1902); 'Zoology' (1894); and a 'Dictionary of Birds' (1893–6).

Newton, Sir **Charles Thomas,** English archæologist: b. Bredwardine, Wales, 13 Sept. 1816; d. Westgate-on-Sea 28 Nov. 1894. He was educated at Shrewsbury School, and at Christ Church College, Oxford, and was assistant in the department of antiquities in the British Museum 1840–52. He became vice consul at Mytilene in 1852, and acting consul at Rhodes in 1854; discovered the tomb of Mausolus at Halicarnassus and the famous bronze serpent of Delphi at Constantinople; and after a year as consul at Rome in 1861 became keeper of Greek and Roman antiquities in the British Museum, being the first incumbent of this post and holding it until December 1885. During this term he furthered archæological excavations in Ephesus, Priene, Smyrna, Sicily, Cyprus, Cyrene, and Rhodes, and procured for the British Museum the Farnese collection, the two Castellani collections, and those of Pourtales and Blacas. From 1880 to 1888, Newton (who was knighted in 1887) was professor of classical archæology in University College, London; to his work there and in the British Museum is largely due the revival of English interest in classical antiquities. He wrote: 'Method of the Study of Ancient Art' (1850); 'History of Discoveries at Halicarnassus, Cnidus, and Branchidæ' (1862–3); 'Travels and Discoveries in the Levant' (1865); and 'Essays on Art and Archæology' (1880).

Newton, Gilbert Stuart, English painter: b. Halifax, Nova Scotia, 2 Sept. 1795; d. Chelsea, England, 5 Aug. 1835. His mother was sister to Gilbert Stuart, the American portrait-painter, his father an officer in the British army, and he went eventually to England after visiting Italy and France (1817). After studying at the Royal Academy he exhibited regularly both in the Royal Academy and the British Institution from 1818 to 1833. He was elected Royal Academician in 1832. The last three years of his life he was confined in a private asylum for the insane. His pictures are mostly domestic scenes, are anecdotic in motif, and he especially excelled in the portrayal of feminine beauty of the English type. His best works include: 'The Gentle Shepherd'; 'The Dutch Girl' (both of which were engraved); 'Porceaugnac and the Doctors'; 'The English Girl'; 'Olivia's Return'; 'The Forsaken.'

Newton, Henry Jotham, American manufacturer and chemist, inventor of the dry-plate photographic process: b. Hartleton, Pa., 23 Feb. 1823; d. New York 23 Dec. 1895. At 20 he was

a partner in the firm of Wittlesey Brothers, piano-makers, Salem, Conn., whom he left six years later to form the New York firm Lighte and Newton; this new company greatly improved the manufacture of pianos. Newton was later connected with the Bradburys in the piano trade; in 1884 he became president of the Henry Bonnard Bronze Co. His invention of a permanent collodion emulsion and of the other details of the dry-plate process in photography dates from 1875. Educated a Presbyterian, Newton joined the Methodist Church, then the Unitarian, and finally allied himself with the Spiritualists. A society formed by him in 1875 for psychical research was, he claimed, the first Theosophical Society, from which Mme. Blavatsky and Henry S. Olcott took the ideas which they falsely proclaimed to be of Indian origin.

Newton, Hubert Anson, American astronomer and mathematician: b. Sherburne, N. Y., 19 March 1830; d. New Haven, Conn., 30 Aug. 1896. He was graduated at Yale in 1850, and in 1855 became professor of mathematics there. He spent one year in foreign study and for the rest of his life lived quietly in New Haven. He was far better known as an astronomer than as a mathematician, because of his remarkable researches as to meteors, and meteoroids, undertaken to verify Olmsted's hypothesis that meteors were the more visible portions of a great stream of bodies with a fixed orbit about the sun, and this hypothesis he proved correct by a brilliant and painstaking series of mathematical computations. He wrote on meteors for several encyclopædias, and published most of his original papers on that subject in the 'Memoirs' of the National Academy and in the 'American Journal of Science,' of which he was long editor. The National Academy awarded him the Smith gold medal for his work on meteors. Newton did much to introduce the study of the metric system into the public school curriculum; was an authority on the theory of transcendental curves; and wrote various tables for life insurance companies. He was a simple, genial, modest man, and deeply interested in the material advancement of Yale College.

Newton, Sir **Isaac,** English mathematician and natural philosopher: b. Woolsthorpe, Lincolnshire, 25 Dec. 1642; d. Kensington 20 March 1727. He was sent at an early age to the village school, and in 1654 to the free grammar school of Grantham. He was entered at Trinity College, Cambridge, in 1661. He had the good fortune to find in the celebrated Dr. Barrow, professor of Greek (1660–3) and from 1663 Lucasian professor of mathematics, an assistant in his mathematical studies. He appears to have found particular interest in Wallis' treatise, 'Arithmetica Infinitorum.' He was graduated in 1665. While absent from Cambridge in 1665–6, during the plague, he discovered the binomial theorem (q.v.) and the direct and inverse methods of fluxions (q.v.) (that is, differential and integral calculus); computed the area of the hyperbola; and first turned his attention to the subject of gravity. The familiar story, first given by Voltaire, is that the fall of an apple led him to reflect on the nature of that remarkable principle which attracts bodies to the centre of the earth. He considered that if the moon was retained about the earth by terrestrial gravity, the planets, which move round the sun, ought similarly to be retained in their orbits by their gravity toward that body. Having determined the law of the gravity of the planets toward the sun he endeavored to apply it to the moon, that is, to determine the velocity of her motion round the earth by means of her distance, as settled by astronomers, and of the intensity of gravity, as shown by the fall of bodies at the earth's surface. To make this calculation it was necessary to know exactly the distance from the surface to the centre of the earth; but unfortunately at that time there existed no correct measure of the earth's dimensions. Newton was obliged to employ the imperfect measures then in use, and found that they gave for the force which retains the moon in her orbit a value greater by one sixth than was allowed by observed facts. This small difference seemed to his cautious mind a strong proof against his bold conjecture. He imagined that some unknown cause modified, in the case of the moon, the general law of gravity indicated by the motion of the planets. Yet he did not abandon his leading notion, but determined to wait till study and reflection should reveal to him this supposed unknown cause. In 1667 he returned to Cambridge as fellow of Trinity, and in 1668 constructed a reflecting telescope. In the latter year Mercator published his 'Logarithmotechnia,' in which he had obtained the area of the hyperbola referred to its asymptotes by expanding its ordinate into an infinite series, which was the main secret of Newton's method. Barrow showed this work to Newton, who immediately gave him his own treatise, but did not yet publish.

In the course of 1666 his attention had been accidentally drawn to the phenomena of the refraction of light through prisms. His experiments led him to conclude that light, as it emanates from the radiating bodies, is not a simple and homogeneous substance, but that it is composed of a number of rays, endowed with unequal refrangibility and velocity and possessing different coloring properties. More than two years elapsed before he returned to his researches on this subject; but in 1669, having been appointed Lucasian professor of mathematics, and preparing to lecture on optics, he endeavored to mature his first results, and composed a complete treatise, in which the fundamental properties of light were unfolded, established, and arranged by means of experiments alone, without any mixture of hypothesis — a novelty at that time almost as surprising as these properties themselves.

In 1672 Newton was chosen a fellow of the Royal Society, to which he communicated a description of a new arrangement for reflecting telescopes, which rendered them more convenient by diminishing their length without weakening their magnifying powers, and soon after, the first part of his labors on the analysis of light, in which he advocated the material theory (that is, that light consists of small particles shot out by a luminous object), the society appointed three members to study it fully and report upon it. Hooke undertook to draw up the report. Instead of discussing the new facts as presented by the experiments of Newton, he examined them merely in relation to his own hypothesis — now known as the undulatory theory, and ac-

cepted as the true one — and concluded by allowing whatever appeared reconcilable with his own hypothesis, and by advising Newton not to seek any other explanation of the facts. Newton in reply adduced new experiments confirming his material (or corpuscular) theory and refuted the objections to the production of whiteness by the mixture of all the rays. He addressed another paper (1675) to the Royal Society, completing the account of his results and of his views on the nature of light. This treatise, united with his first paper on the analysis of light, afterward served as the base of the great work, 'Treatise on Optics' (1704), in which, however, the experimental investigation of the phenomena is more extensive and more strictly separated from all hypothesis. It is now known that Newton was wrong, and tnat light results from wave-motion in a pervading medium called ether. But Hooke's explanations were vague, and his theory remained untenable until the discovery, a century later, of the principle of interference (q.v.). In 1679 Newton had occasion to write to Hooke about a system of physical astronomy on which the Royal Society had asked his opinion. Hooke and Newton held conflicting opinions, and Newton, having examined by mathematical calculations a position maintained by Hooke, found that an attractive force, emanating from a centre, and acting inversely as the squares of the distances, would produce motions exactly resembling the planetary motions both in regard to the form of the orbit and the velocity of the body at each point. This was the secret of the system of the world; but it still remained to account for the discordance of the moon's motion, which had before (1665) embarrassed Newton. But in 1682 he learned the results of a new measurement of the arc of a meridian. Two years were spent in following up the consequences of this discovery, and preparing his immortal work 'Philosophiæ Naturalis Principia Mathematica'; but it was not till 1686 that he concluded to present his work to the society, and it was printed in 1687 at the personal expense of Halley, the secretary. Newton's teachings were introduced at Cambridge in 1699 and at Oxford in 1704, but were not admitted by the French scientists for half a century.

In 1687 Newton was one of the delegates sent by the University of Cambridge to maintain its rights before the High Commission court when they were attacked by James II., and in 1689 he was elected by the university to the convention parliament, but never distinguished himself in that body. He had always taken great interest in chemistry, and constructed a small laboratory for prosecuting his investigations, and seems, after the publication of the 'Principia,' to have devoted almost his whole time to them.

In 1696 he was appointed warden of the mint, a general recoinage having then been undertaken. In this office he rendered essential service, and in 1699 was made master of the mint. In 1701–2 he again sat in Parliament for his university; in 1703 he was chosen president of the Royal Society; and in 1705 was knighted by Queen Anne. In 1704 he gave to the world his 'Optics,' which contains all his researches on light. Later works were his 'Arithmetica Universalis' (1707; more complete 1712); 'Methodus Differentialis' (1711); and his 'Analysis per Equationes Numero Terminorum Infinitas' (1711); 'Chronology of Ancient Kingdoms Amended' (1728); and 'Observations on Daniel and the Apocalypse' (1733), an attempt to show the fulfilment of the prophecies. In 1705–12 he was involved in a controversy with Flamsteed; and in 1705–24 in one with Leibnitz as to priority in the discovery of fluxions. The splendid genius of Newton has often been testified to, among many by Macaulay, who declared that in no other person did the demonstrative and inductive faculties ever exist in such perfect co-ordination. His statue, by Roubiliac, stands in Trinity College, Cambridge. Horsley's edition of his works (1779–85), with the 'Opuscula,' collected by Castillon (1744), and his 'Letters,' inserted in the 'Biographia Britannica,' contain nearly all his printed works. Three editions of the 'Principia' were published in his own lifetime; the last reprinted at Glasgow in 1871 by Sir W. Thomson (Lord Kelvin) and Professor Blackburn. The standard 'Life of Newton' is that by Sir David Brewster, who had full access given him to the great mass of Newton's papers (1855; 2d ed. 1860).

Newton, John, English astronomer and mathematician: b. Oundle, Northamptonshire, England, 1622; d. Ross, Herefordshire, England, 25 Dec. 1678. He was graduated from Oxford University in 1642 and engaged in mathematical and astronomical work, remaining loyal to the king during the Protectorate. After the Restoration he was made king's chaplain in 1661 and became canon of Heresford in 1673. He wrote: 'Institutio Mathematica' (1654); 'Geometrical Trigonometry' (1659); 'Introduction to the Art of Logic' (1671); 'Cosmography' (1679); etc.

Newton, John, English clergyman: b. London 24 July 1725; d. there 21 Dec. 1807. He led a wandering life on the sea in 1736–55, but in 1748 underwent strong religious experiences, the effects of which were increased by the preaching of Wesley and Whitefield, and after a period of private study was ordained priest in the Church of England in 1764. From 1764 to 1780 he was curate of Olney, Buckinghamshire, and then became incumbent of Saint Mary Woolnoth, London, where he preached until the year of his death. His evangelical influence was very strong there, and he preached to large congregations. He is best known, however, for his connection with the poet Cowper, who settled at Olney in 1767, and who was kept occupied by the good man in an almost unintermitted round of religious exercises. Newton seems to have foreseen the outcome, and endeavored to provide congenial occupation for the poet in seeking from him contributions to the 'Olney Hymns.' Newton received his D.D. from the College of New Jersey (Princeton) in 1792. Among his publications are 'Review of Ecclesiastical History' (1770) and 'Cardiphonia' (1781). See COWPER.

Newton, John, American military engineer: b. Norfolk, Va., 24 Aug. 1823; d. New York 2 May 1895. He was graduated from West Point in 1842 and was appointed to the engineering corps. At the beginning of the Civil War he was chief engineer of the department of Pennsylvania and in September 1861 was made brigadier-general of volunteers. He served with

distinction through the war and in 1865 was promoted brigadier-general and major-general in the regular army. He was mustered out of the volunteer service in 1866 but continued in the regular army, and in 1884 was made chief of engineers. He engineered the removal of the obstructions at Hell Gate Channel in the East River, New York; was commissioner of public works in New York, and in 1886 was retired at his own request.

Newton, Richard Heber, American Protestant Episcopal clergyman: b. Philadelphia 31 Oct. 1840. He was son of the rector of Saint Paul's, Philadelphia, studied in the Philadelphia Divinity School, was assistant to his father (1860–2) and, after a short time in a church at Sharon Springs, N. Y., succeeded his father in Philadelphia, leaving this charge in 1869 to go to All Souls' Church, New York. In 1903 he was appointed preacher to Leland Stanford, Jr., University but soon resigned this position. He is a broad-churchman, and has several times been threatened with trial for heresy. He took a prominent part in the Congress of Religions held at Chicago in 1893 and is now vice-president of the organization of this congress. He wrote: 'The Morals of Trade' (1876); 'Womanhood' (1880); 'Philistinism' (1885); 'Social Studies' (1886); 'Church and Creed' (1891); and 'Christian Science' (1898).

Newton, William Wilberforce, American Episcopal clergyman: b. Philadelphia, Pa., 4 Nov. 1843. He was graduated from the University of Pennsylvania in 1865 and has held important rectorates in Newark, N. J., Boston, Mass., and Pittsfield, Mass. He has published: 'The Pilgrim Series of Sermons to Children'; 'A Run Through Russia'; 'The Child and the Bishop'; 'Summer Sermons from a Berkshire Pulpit'; etc.

Newton, Ill., city, county-seat of Jasper County; on the Embarras River, and on the Peoria, D. & E., and the Illinois S. R.R.'s; about 100 miles in direct line southeast of Springfield. It is in a productive agricultural region, and in the vicinity of large coal fields. The chief manufactures are dairy products, flour, brick, tile, lumber products, and woolen goods. The city has considerable trade in farm and dairy products, fruit, coal, and its manufactures. Pop. (1890) 1,428; (1900) 1,630.

Newton, Iowa, city, county-seat of Jasper County; on the Chicago, Rock Island & P. and the Iowa Central R. R.'s; about 30 miles in direct line east by north of Des Moines, the capital of the State. It is the commercial centre of a rich agricultural section in which considerable attention is given to stock-raising. The chief manufactures are flour, foundry and machine-shop products, agricultural implements, tile, and brick. The trade is chiefly in farm products, live-stock, and manufactures. The city owns and operates the waterworks. Pop. (1890) 2,564; (1900) 3,682.

Newton, Kan., city, county-seat of Harvey County; on the Atchison, T. & S. F., the Gulf, C. & S. F., and the Missouri P. R.R.'s; about 115 miles southwest of Topeka. It is in the south central part of the State, in the valley of the Arkansas River, one of the most fertile sections of Kansas. It was settled in 1871 and incorporated a city in 1880. The chief manufacturing establishments are flour mills, drill factory, separator factory, creamery, large ice plant, and stock yards. It is a division point of the Santa Fé Railroad and has repair shops. The number of railroad employees who are residents of Newton is about 500; and about 200 men are employed in the manufacturing establishments mentioned. There are 15 churches for white people and two for the colored. It is the seat of Bethel College, the only college in America under the auspices of the Mennonite Church (1904). It has a high school, good public and parish schools, and a Carnegie library. The three banks have a combined capital of $160,000. The government is vested in a mayor, who holds office two years, and a council of eight members, also elected biennially. The majority of the people are native born; the foreign born are Germans, Irish, a few Swedes and French.

J. C. MACK,
Manager, 'Kansas Republican.'

Newton, Mass., city in Middlesex County; on the Charles River, and on the Boston & A. railroad; six miles west of Boston. The area is 18 square miles; the city includes 13 villages. It was settled in 1631 and was part of Cambridge until 1688, when it was incorporated as a town under the name of New Cambridge, which name it retained until 1692; the city charter was granted in 1873. Newton is a beautiful residential city; within its limits is a part of the Metropolitan Park; its own city parks cover an area of about 170 acres. A large cemetery, in a prominent part of the city, contains the graves of many people noted in history. Newton has some manufacturing establishments, chief of which are boot and shoe factories, silk mills, fire-alarm supply works, rubber works, paper-box and curtain factories, printing works, worsted mills, and cordage factory. It has the Lasell Seminary for women (1851); the Allen School for boys (1853); Saint John's Industrial School, the Newton Theological Seminary, opened in 1825 under the auspices of the Baptists, and a public library which contains about 62,000 volumes. The prominent public buildings are several beautiful churches, the high school, the elementary and parish schools. Near the site of Waban's Wigwam, where John Eliot began to preach to the Indians, 28 Oct. 1646, stands the Eliot Memorial.

The annual municipal expenditures for maintenance and operation are about $1,000,000. The chief items of expense are: for public schools, $200,000; for streets, parks, sewers, $172,000; interest on debt, $264,000; police department, $69,500; fire department, $59,000; municipal lighting, $54,000; health department, $22,000; charity, $26,000. The government is administered under a revised charter of 1902, which provides for a mayor who holds office two years; and a board of aldermen consisting of 21 members, three from each ward. The mayor and aldermen appoint or elect the administrative officials, except the school board, which is chosen at a popular election and for a term of three years. The city owns and operates the waterworks. Pop. (1890) 24,379; (1900) 33,587. Consult Smith, 'History of Newton.'

Newton, N. J., town, county-seat of Sussex County; on the Delaware, Lackawanna & W. railroad; about 40 miles northwest of Newark. It is in an agricultural region, and in the vicin-

ity are slate quarries. The chief manufactures are roofing slate, silk, paper boxes, shoes, and dairy products. It is the seat of the Newton Collegiate Institute and it has the Dennis Library, which contains about 9,000 volumes. Newton is known as a summer resort. The town owns and operates the waterworks. Pop. (1890) 3,003; (1900) 4,376.

Newton Theological Institution. See NEWTON, Mass.

Newto'nian Philosophy. See NEWTON, SIR ISAAC.

New'town, N. Y., since 1898 a part of the borough of Queens in New York city; formerly a separate town in Queens County. It was settled in 1652 by people from New England, and was first called Middleburgh. In 1664 it became a part of Connecticut and was then called Hastings. The following year it came into possession of New York and the name was changed to Newtown. Consult Riker, Jr., 'The Annals of Newtown.'

Next Friend, in law, an adult, other than a guardian, who represents in an action, another person not legally competent to maintain a suit in his own behalf. The practice originated in England in the time of Edward I. A next friend is not a party to an action but acts solely for another, and is considered an officer of the court.

Ney, nā, **Michel,** Duke of Elchingen, Prince of the Moskva, French soldier: b. Sarre-Louis (Moselle) 10 Jan. 1769; d. Paris 7 Dec. 1815. In 1787 he entered the military service. He soon attained great distinction for bravery, was quarreled over by Kleber and Jourdan as to who should have his services, contributed greatly to the victory of Hohenlinden, and obtained the marshal's baton in 1804. He opened the campaign of 1805 against Austria by a brilliant victory at Elchingen 14 October (whence his title Duke of Elchingen), and brought about the capitulation of Ulm. He occupied the Tyrol, and marched on to Carinthia, when stopped in his career by the Peace of Presburg. In 1806 and 1807 he fought at Jena, and after the capture of Magdeburg at Eylau and Friedland. In 1808 he maintained his high reputation in Spain. Napoleon recalled him, but kept him at a distance till the commencement of hostilities against Russia, when he received the chief command of the 3d division of the imperial forces. He commanded the centre at the battle of the Moskva, and so distinguished himself as to earn the title of Prince of the Moskva. In the conduct of the retreat, in which he commanded the rear-guard, his ability, valor, and devotion were conspicuously manifest, and he exerted himself to the utmost to save the wreck of the army Napoleon and Murat had deserted. In 1813 he decided the victory of Lützen, assisted at Bautzen and Dresden, but was defeated by Bernadotte at Dennewitz. He was now obliged to retire to Torgau, but soon took the field again; chased the Swedes from Dessau; and fought at Leipsic and Hanau. When the enemy entered France he disputed every step of their progress. Brienne, Montmirail, Craonne, and Châlons-sur-Marne are shining names in the history of his battles.

After Napoleon's abdication, Ney took the oath of allegiance to the king, was made a peer, and received the cross of Saint Louis and the command of the cuirassiers, dragoons, chasseurs, and light-armed lancers. He enjoyed marked distinction at court, and appeared to be entirely devoted to the Bourbons. When Napoleon landed on his return from Elba Ney collected a large force, was appointed its commander, and with many assurances of his zeal and fidelity to the king marched against the invader. But noticing the desertion of his soldiers and their inclination for Napoleon he regarded the cause of the Bourbons as lost. He joined Napoleon at Lyons on 13 March, and thus opened his way to Paris. Napoleon gave him the command of his left wing, which engaged with the British at Quatre Bras. At Waterloo he led the last charge of the Old Guard, and had five horses shot under him. His clothes were full of bullet-holes, and he fought on foot till night in the midst of the slain. He was tried for treason, sentenced (5 December) to death, and shot in the Luxembourg garden. "After the execution," says Lamartine, "bitter shame seized on every soul." It was universally regretted that Ney, the brave, had been chosen to suffer. Consult: 'Mémoires du Maréchal Ney' (1833); Rouval, 'Vie du Maréchal Ney' (1833); Nollett-Fabert, 'Eloge Historique' (1852).

Nez Percé (nā pĕr-sā') **Indians.** See CHOPUNNISH; SAHAPTIAN.

Ngami, ngā'mē, **Lake,** Africa, in Western Rhodesia, north of the Kalahari Desert, a portion of a great prehistoric inland sea, when first visited by Livingstone and Oswell in 1849, about 20 miles long, 10 miles broad, and very shallow. Its only feeder was the Teoge or Kubango and its outlet the Botletli or Zuga. In the rainy season the water was fresh, but in the dry season the lake became a mere brackish marsh. Since 1890 the waters have gradually disappeared, the site of the lake now being marked by an extensive reedy marsh-land, some portions of which are utilized for growing corn.

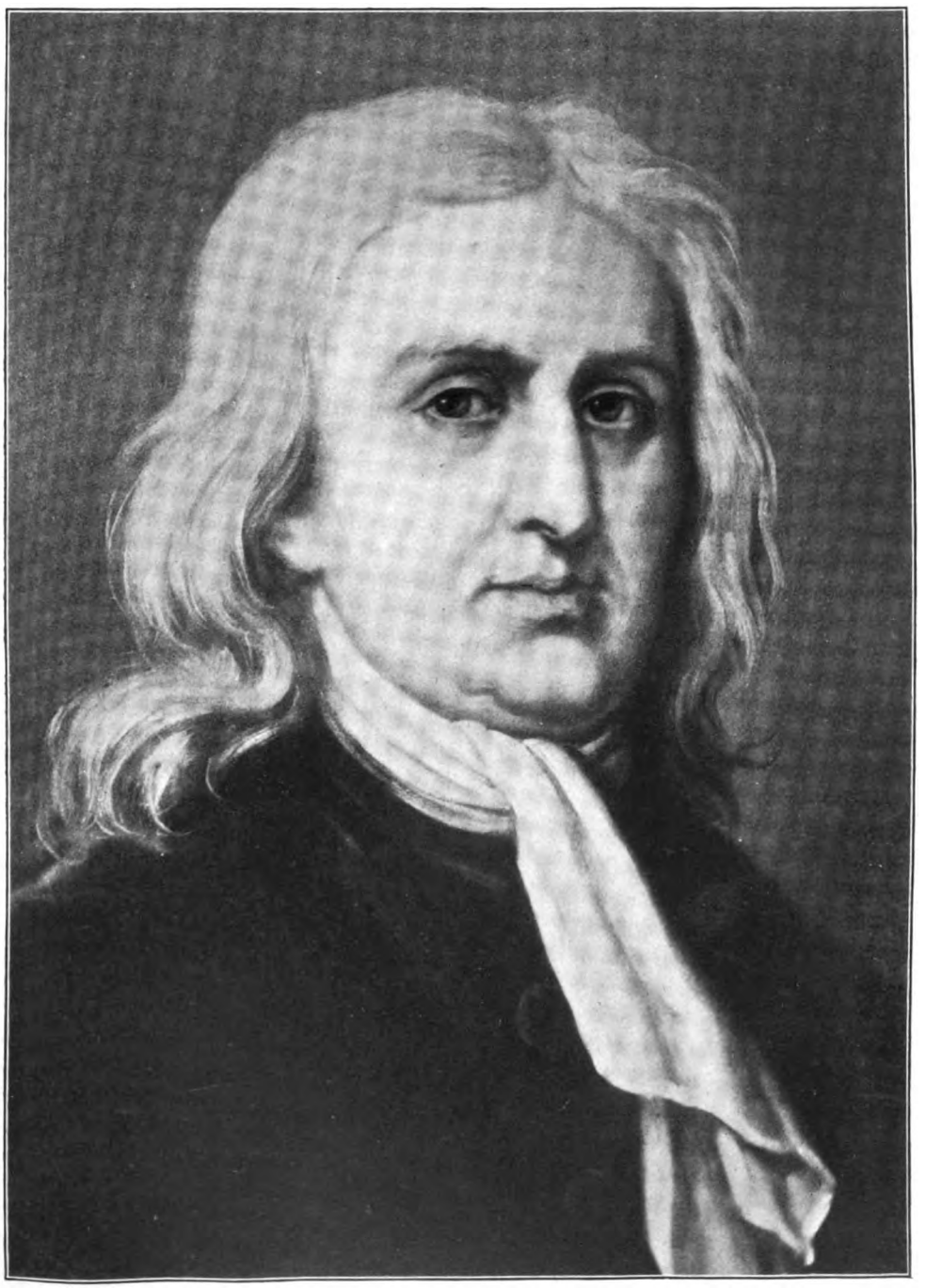
Ngan-Hui, n-gän-hwē', or **Ngan-Hwei,** n-gän-hwā'ē, China, an eastern inland province, intersected by the Yang-tse-kiang, separated from the ocean eastward by the provinces of Che-kiang and Kiang-su, and bounded northwest by Ho-nan, west by Hu-peh, and south by Kiang-si. Area 54,810 square miles; pop. (1901) 23,670,314. Capital Ngan-king-fu (q.v.).

Ngan-King-Fu, n-gän' kĭng' foo', China, a city and river-port, capital of Ngan-hui (q.v.), on the north bank of the Yang-tse-kiang, about 200 miles above Nanking, since 1897 open to foreign trade. It suffered severely during the Tai-ping Rebellion. Pop. about 50,000.

Ngornu, n-gŏr'noo, or **Angornu,** Africa, a town of Bornu, British Northern Nigeria, on the southwest shore of Lake Chad, 15 miles south of Kuka, the capital. It is on the trade route communicating with the interior and the coasts, and its fairs are of great commercial importance. The town is subjected to inundations from the lake during the wet season. Pop. (est.) 40,000.

Niagara, nī-ăg'a-ra, **Battle of.** See LUNDY'S LANE, BATTLE OF.

Niagara Falls, Canada, a town of Welland County, Ontario, on the west bank of the Niagara Gorge, just below the Falls, and opposite Niagara Falls, N. Y. It communicates with



SIR ISAAC NEWTON.

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the United States by three bridges, has electric and steam railroad service, and is a station on the Michigan Central, Grand Trunk, and Saint Catharine's & Niagara Central R.R.'s. It commands the best view of the Falls from Queen Victoria Niagara Falls Park, extending above and below the Falls for two and a half miles. Enormous works on a larger scale than those on the United States side, to utilize the water power, are being constructed. The town was originally named CLIFTON or SUSPENSION BRIDGE after its English prototype at the Severn Gorge, Bristol (q.v.). Pop. (1901) 4,244.

Niagara Falls, N. Y., city in Niagara County; on the Niagara River, and on the New York C. & H. R., the Wabash, the Erie, the Michigan C., the Grand T., the West S., and the Lehigh R.R.'s; about 25 miles north by west of Buffalo. Until 1892 what is now the city constituted two separate villages, Niagara Falls and Suspension Bridge; they were consolidated in that year and chartered as a city. (For the New York State Reservation and the bridges connecting the city with the town of Niagara Falls (q.v.), Ont., see NIAGARA FRONTIER.) The manufacturing establishments have increased and are increasing since the utilization of the power of the river by the new methods. The chief manufactures are paper, flour, dressed lumber, wheat biscuit, electro-chemical products, foundry products, machinery, chemicals, and wood products. It has a public library, the building for which was donated by Andrew Carnegie, a high school, business schools, public and parish schools, the De Veaux College (P. E.), and the Niagara University (q.v.).

On account of the Falls, one of the scenic wonders of the world, the city is visited annually by thousands of tourists. The government, administered under the original city charter, provides for a mayor, who holds office one year, and a council. The administrative officers are appointed or elected by the mayor and council. The city owns and operates the waterworks. Pop. (1890) 19,457. See NIAGARA FRONTIER.

Niagara Falls. The Niagara River is about 32 miles long from its beginning at Buffalo to its termination at Fort Niagara; it connects Lake Erie, 573 feet, with Lake Ontario, 247 feet above the ocean, and carries the drainage of Lakes Superior, Huron, Michigan, Saint Clair, and Erie, estimated at a flow equal to 20,000,000 cubic feet of water per minute by the way of the Saint Lawrence into the ocean. About 20 miles from Buffalo and 12 miles from Fort Niagara are situated the Falls of Niagara, in 42° 55′ N. and 79° 5′ W.; the "Thunder of Waters" of the aborigines; the "most awe-inspiring spectacle" ever seen by Father Hennepin in all his travels, when he first viewed them in 1678; the point toward which 3,000,000 of people travel annually from all parts of the American continent and from Europe. Here the waters which have descended 50 feet in a series of rapids within half a mile make a sudden plunge of 165 feet in two divisions. The American Fall, with a more or less straight crest of 1,060 feet in length, extends along the eastern bank of the river in a north-northeast and south-southwesterly direction; while the other division, the Horseshoe or Canadian Fall, with a deep curve in the centre, runs at right angles to the course of the river. The crest of the latter measures 3,010 feet and carries by far the largest volume of water. The line of deepest water is accepted at about the middle of the Horseshoe Fall, and as that more or less imaginary line forms the boundary between the United States and the Dominion of Canada, the islands at and near the Falls of Niagara are all United States territory. From the foot of the Falls the river descends among cliffs of 200 to 350 feet high in a series of rapids for a distance of three miles until it reaches the Whirlpool, a circular excavation in the westerly bank of the river, the boundaries of which are rocky cliffs 300 feet high for about two thirds of its circumference, while the other third, its northerly bank, is made of an accumulation of sand, gravel and clay. Into this hole the river rushes with tremendous force and speed, in a northwesterly, but has to turn at right angle and leave it in a northeasterly, direction. The impact of the inrushing water, striking against the banks, meets in its recoil new waters looking for an outlet, and the meeting of these different currents produces the rotary movements of the waters from which the Whirlpool derives its name, and as an exhibition of wonderful water-power the Whirlpool and the Whirlpool Rapids are looked upon by many visitors as more interesting than the Falls themselves. A further series of rapids carry the water to Lewiston, at the foot of Lewiston escarpment. Here the gorge ends and the river flows in a low plain down to Lake Ontario. The width of the gorge varies from 700 feet at the Whirlpool Rapids to 1,700 feet opposite the centre of the American Fall. These measurements are for the tops of the gorge; at the water line these figures are usually reduced one half on account of the talus which has accumulated; thus, the gorge at the inlet to the Whirlpool measures 1,000 feet at the top and 550 feet at the water. The outlet of the Whirlpool has a width of 900 feet at the top and 450 feet at the water. After the river leaves the gorge at Lewiston it has a fairly uniform width of 2,000 feet.

The narrowest part of the river is at Foster's Flats, about one mile below the Whirlpool, on the Canadian side. Although the tops of the banks here are 1,500 feet apart, the river is scarcely 300 feet wide. A platform of limestone projects out into the river, and from its base a well-marked dry channel leads northward for about one third of a mile to the edge of the water. The floor of this channel is strewn with huge limestone blocks, and its westerly bank is continuous with the steep wall of the present gorge.

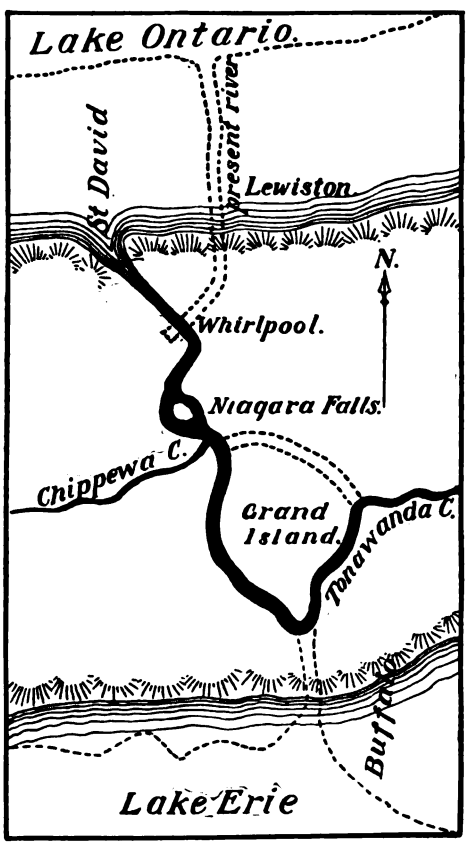
The depth of water on the crest of the American Fall is fairly well known, and measures from 4 to 10 feet; northerly and easterly winds at times set the water back in Lake Erie, and the fall has been known to be almost dry. The depth of the Horseshoe Fall is not known. The only attempt to obtain any approximate idea was made many years ago; an old vessel was loaded down with stones until it drew 20 feet of water, and started down the current; it went over the edge without touching, hence the conclusion was that the deepest water on the edge of the Horseshoe Fall is at least 20 feet.

The depth of water in the river has been usually overestimated by hundreds of feet until the United States Lake Survey has given us a series of soundings as follows:

	Feet
At the foot of the centre of the Horseshoe Fall	150–200
Through the upper gorge to the Whirlpool Rapids	160–190
Whirlpool Rapids	35
Whirlpool	150
Whirlpool outlet	50
Gorge below Whirlpool	35–70

Of course, with such tremendous currents, twisting and whirling in all directions, soundings cannot be much more than approximate, but they dispel the idea of the many hundreds, and even thousands, feet of depth entertained before.

If we make an imaginary ascent from Lake Ontario for a geographic study, we find a vast plain, seven miles long from north to south and as far as the eye can reach east and west, which brings us to the so-called first limestone terrace of New York, more popularly known on the American side as Lewiston Heights, on the Canadian side as Queenston Heights. Here we ascend suddenly 250 feet. In this escarpment we have two gaps, one about one quarter of a mile wide through which dashes the Niagara River, and three miles to the west another about one mile in width, at the little town of Saint David's. Ascending this old valley in a southeasterly direction we arrive at the Whirlpool. Excepting this Saint David's Valley and the gorge of the Niagara, the land to the south of the escarpment is fairly level until we meet above the Falls two shallow valleys; on the west that of Chippewa Creek and on the east that of Tonawanda Creek, tributaries to the Niagara River. The southern bank of the valleys of these creeks is formed by the second limestone terrace of New York, which runs through Canada, forms partly the north shore of Lake Erie, crosses Niagara River, presents a very conspicuous unit in the landscape of northern Buffalo, and runs in a west-southwest and east-northeast direction through western New York.



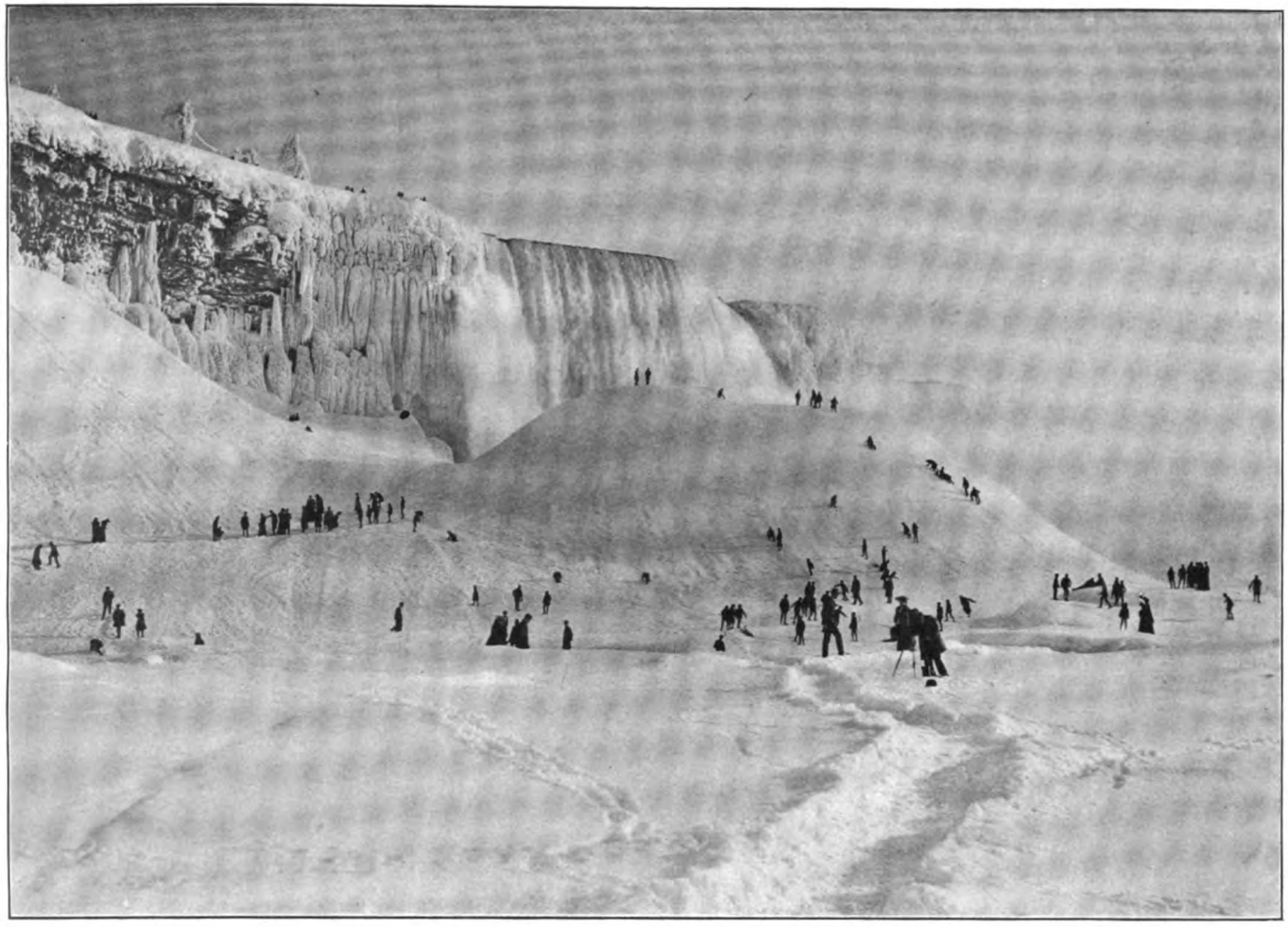
Preglacial Drainage.

(Dotted lines, present drainage; black lines, preglacial drainage.)

The life history of Niagara Falls is of supreme importance to the geologist to-day, as its complete elucidation would give a measurement of the time elapsed since the disappearance of the northern ice sheet of the Glacial period. Since the time of Hall and Lyell, in 1842, up to the present of Walcott and Grabau, the problem has been attacked with vigor and care, and viewed and reviewed from every possible standpoint and according to the varying theories of the time. Spencer, Pohlman, Upham, Taylor, Wright, Hitchcock, Bishop, are the names of but a few of those who have studied the problem, and there is still variety enough of opinion to interest many more. As a matter of estimates of the age of the Falls, the consensus of geological opinion varies between 5,000 and 50,000 years, and demonstrates that this absorbing study is far from being exhausted.

The site of the present Niagara Falls and river was in general outlines determined in preglacial times, when the American continent stood at an elevation of from 2,000 to 5,000 feet higher than at present. A system of large rivers had excavated the present basin of Lake Erie, and the combined drainage of these valleys found its way into the present basin of Lake Ontario by the way of the Dundas Valley and the city of Hamilton, Ontario. These rivers could not have drained along the present Niagara River, because the inlet at Buffalo was closed by the limestone terrace, the top of which was from 100 to 150 feet higher than the river-bed which had been excavated to the south of it, the valley of which now forms the eastern end of Lake Erie. The rock bottom of Lake Erie is almost everywhere covered by a deposit of clay and gravel to the height of 100 to 300 feet and at its eastern end the real lake bottom is from 80 to 100 below its apparent bottom. The present Niagara River flows at Buffalo over rock at a depth of from 14 to 16 feet.

With the continent at several thousand feet higher above the ocean level than to-day, these large river valleys could excavate their beds deeper down than at present, and we can understand why the bottom of all the Great Lakes, with the exception of Lake Erie and Lake Saint Clair, is about 500 feet below the ocean level. During the same period the present Tonawanda and Chippewa creeks had excavated a shallow east and west valley in the

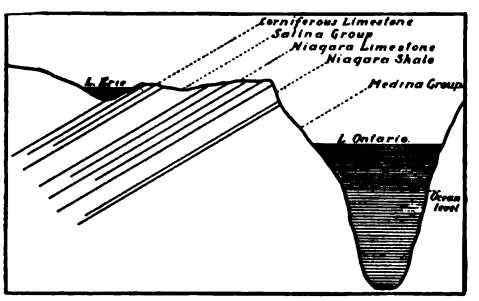


A VIEW OF NIAGARA FALLS IN WINTER.

Uofm

soft shale of the Onondaga Salt group, and combining their waters, they found their way north by the way of Goat Island, upper gorge, Whirlpool, and Saint David's Valley into the basin of Lake Ontario.

The action of small streams under similar conditions, excavating their gorges and finding their way north over the same strata as those at Niagara, can be studied to advantage in the 14-mile creek at St. Catharines, Ontario, or at Oak Orchard Creek or in the Genesee River of New York. Beginning at the mouth of these creeks and traveling up-stream, we find three falls, one over the sandstone layer of the Medina group, one over the Clinton limestone, and the largest over the Niagara limestone, near the top of the escarpment. These falls are connected with each other by a longer or shorter series of rapids. In an attempt to reconstruct the preglacial Niagara Valley by the data learned from a study of these creeks, we ascend the valley of Saint David, and find our first fall over the Medina sandstone at the Whirlpool, and the second and third higher up, perhaps somewhere near the present railway bridges. Whether this little stream originally outlined the Falls' islands, must remain a matter of conjecture at present; suffice it to say that beginning at the northerly part of Buffalo, we have a continuous preglacial valley draining northward by the way of the Whirlpool and Saint David, while the lake basin to the south of the Buffalo watershed was at least 150 feet below the top of the limestone terrace, and drained to the west.



Cross Section between Lakes Erie and Ontario.

The geologic section of the Niagara region from Lake Ontario to Lake Erie exposes the following strata of the Silurian: The Medina series, sandstones and shales, distinguished in this section by their bright red color; the Clinton series, shales and limestone; the Niagara shale and limestone; the Salina series, gypsum and shales in varying thickness; the Waterline group. Of the Devonian: the Corniferous and Helderberg limestones. As the strata dip in this section about 20 to 25 feet to the mile from north to south, and our ascent is from north to south, we successively meet all the series from the Medina group to the Niagara limestone as we travel up the gorge along the cut of the New York Central Railroad; but for a comprehensive view of an ideal geologic section the walls of the gorge at Lewiston must be studied. Beginning at the water's edge we have about 230 feet of shales and sandstones of the Medina series, of red color; above this 32 feet of Clinton limestone and shale, of greenish and white color; overlaid by 70 feet of gray colored Niagara shale and 20 feet of drab colored Niagara limestone. This strata of limestone increases in thickness as we ascend the gorge until it reaches about 130 feet at the head of the rapids above the falls. The upper 50 feet of this limestone is thin-bedded and offers but little resistance to erosion, but below these are 70 feet of thick-bedded resistant stone, and the falls rush over the edge of this, making profile of the Falls: compact Niagara limestone 70 to 80 feet; Niagara shale 70 feet; Clinton limestone 10 feet.

Ascending in our geologic series from the Falls southward, we have the valley of Chippewa and Tonawanda creeks excavated from the soft shales of the Salina series; the southern boundary of these valleys consists of bold cliffs formed by the Waterlime, Corniferous, and Helderberg groups, and is succeeded on the south by the erosion of the basin of Lake Erie in the soft shales of the Hamilton group.

With the advent of the ice period the drainage system of the North American continent underwent a change. In the Niagara section the ice, advancing from the north and east, filled the basin of the Ontario Valley, and the streams flowing into it had to find an outlet toward the south. This was undoubtedly the time when the combined Tonawanda and Chippewa creeks, set back on the north, overflowed their southern boundary at Buffalo, the second limestone terrace, and drained into the valley of Lake Erie, 150 below, which overflow finally eroded the present inlet of the river.

The disappearance of the ice sheet in its recession northward gave birth to immense glacial lakes whose northern drainage was stopped by the southern face of the ice. With the constant increase of these water masses by the more or less rapid melting of the ice sheet, the outflow was at different times in different places of the divide to the south by the Mississippi or the Mohawk valleys. At times slowly, at times faster, the level of these glacial lakes lowered; the continent which previous to the Glacial epoch had stood several thousands of feet higher, lowered in a general way and tilted in circumscribed areas. While the ice slowly retreated, the main outlet of the area which covered Lake Erie and its surroundings was by the Wabash River into the Ohio, 200 feet above the present level of the lake. The shore lines of this vast body of water can be traced for hundreds of miles, and like similar shore lines around Lake Ontario, were early chosen for highways or for the founding of settlements.

When finally the lake level had lowered down to Lewiston Height, we would have Lake Erie at about 30 feet higher than at present, pouring its waters in a broad lake-like expansion through the gap at the present site of Niagara Falls and islands, and flowing in a broad expanse over the edge of the escarpment. As Lake Ontario lowered, the overflowing waters found the lowest point in the escarpment near the site of Lewiston and commenced to erode the present gorge. It will hardly do to speak about Falls at Lewiston in the proper sense of the word, because the comparatively thin layer of Niagara limestone on the top with vast masses of soft shale beneath did not offer resistance enough to the immense drainage for

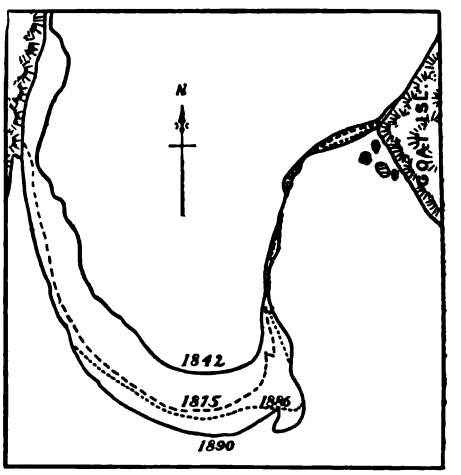
the formation of a fall, but made the work of erosion easy and formed a series of rapids as the level of Lake Ontario lowered. This newly formed gorge eating its way southward soon met the ancient channel of the combined waters of the Tonawanda and Chippewa creeks at the present whirlpool, and from here found it easier to erode the drift filled preglacial valley up to the Falls, than to form a new gorge. In this way we can account for the right angle formed by the river between its inlet and its outlet at the whirlpool.

Whether the peculiar short valley at Foster's Flats gives us the place where the great cataract halted for a while divided by an island; whether it was the full force of the present current which produced this peculiar phenomenon, or whether a mass of water, much reduced on account of the tilting of the lake outlets, gives a more satisfactory explanation, must be left to future investigations.

Beyond doubt the immense volume of water eroded its way southward in the preglacial channel. Rapidly obliterating the small fall over the Clinton limestone, it left the fall which originally tumbled over the Medina sandstone as a long series of rapids both at the inlet and the outlet of the whirlpool and traveled to the south along the ancient gorge as one fall. The increasing thickness of the Niagara limestone retarded its southward progress more and more, hence any attempt to speak about the age of the gorge at the present time must be accepted with a wide margin. Receding southerly as one fall until probably opposite the northern end of the American fall, Goat Island and the other small islands on the American side, came into consideration and the Falls divided. The largest volume of water remained in the clearest and deepest channel, westerly of Goat Island, while the lesser volume divided itself among the islands and remained on the American side. From this time on, the Falls, looked upon as one, ceased to travel straight southerly, but swung round in a circle with the northern point of the American fall as the centre. The Horseshoe Fall, owing to its clearer channel and larger volume of water, receded faster, eating away the westerly side of Goat Island, and at present it already swings its way around the southerly side of Goat Island, indicating that at some near future geologic time, it will draw away all the water from the American side, leaving the present American Falls and the islands high and dry and wending its way southerly and easterly again as one cataract.

The oldest drawing and description of the Falls of Niagara have been handed down to us by Father Hennepin, the first white man who saw them, in 1678. He says they are "above six hundred feet high," and we can forgive his exaggeration in view of his enthusiasm, for very few people of to-day, when seeing the falls for the first time, and not having their minds biased by figures, are capable of forming even an approximately correct estimate of the height from which the waters tumble down; one half will over-estimate it immensely, while the other half will err to an equal extent on the other side. Very much depends upon the spot from which the first view is obtained.

The first scientific survey of the Falls was made by Prof. James Hall, State geologist of New York, in 1842, and his work has formed the foundation of all subsequent surveys. The most interesting part of all these surveys is that they demonstrate the changes which have taken place in recent times in the crests of the Falls. A comparison of the surveys of 1842, 1875, 1886 and 1890 shows that the American Fall has receded at the rate of 0.64 foot per year, or 30.75 feet between 1842 and 1890, and the Horseshoe Fall during the same period 2.18 feet annually, or 104.51 feet in 48 years, a very much higher rate of recession than



Recession of Horseshoe Fall.

was dreamed of prior to the second survey in 1875 and its discussion in 1883. Of course the Falls do not recede evenly, some parts of the crest remain more or less stationary while others change rapidly. The figures above represent the points of greatest activity. The total area of rock surface which has disappeared at the American Fall between 1842 and 1890 represents about 33,000 square feet or three fourths of an acre; at the Horseshoe Fall there has disappeared during the same period 275,000 square feet or 6.3 acres. In all descriptions of the American Fall we speak of one, although there are two; but the second one, the Luna Fall, is so small that it is ignored. It is interesting only as it affords the visitor an opportunity to go in behind the falling waters into the so-called "Cave of the Winds."

Geologists have often indulged in speculations regarding the future of Niagara Falls, and how many thousands of years it would take before the increasing thickness of the Niagara limestone and the decreasing exposure of the soft underlying shales would reduce the height of the Falls to a minimum or even to a mere series of rapids. Judging from present indications, the utilitarian spirit of the age will destroy this wonder of nature long before any changes produced by the natural course of events can mar its beauty or diminish its grandeur. With the discovery of long distance electric transmission there have sprung up, on both sides of the river above the Falls, water power plants for the production of electricity, each one of which robs the Falls of a certain amount of water; these will multiply unless the

State of New York and the Province of Ontario co-operate and adopt laws to prevent any additional withdrawal of water by the plants now existing, as well as by the formation of new power companies.

Twenty years ago New York State paid $1,500,000 for the present reservation and placed it under State control "to preserve the scenery of the Falls of Niagara, for in all that is grand and sublime in the works of nature, there resides a power to educate and refine which is of inestimable worth." The Province of Ontario took the same course very soon after; and it behooves the present century to see to it, by the most stringent laws, that this sublime legacy of the last century, the Reservation at Niagara, American and Canadian, is handed down to future generations unimpaired by commercialism and fit to fulfil its grand mission among the educational forces of the world, for the waters of the Falls of Niagara do not belong to a few companies, or to New York State or to the Dominion of Canada, but they belong to mankind, irrespective of nationality or color.

DR. JULIUS POHLMAN,
Late Professor University of Buffalo.

Niagara Falls Power-works. See NIAGARA FRONTIER.

Niagara Fort. See FORT NIAGARA.

Niagara Frontier, common designation of the region bordering the Niagara River, 37 miles long, between Lakes Erie and Ontario, presenting features of exceptional scenic, scientific, historic, political and industrial interest.

Geographical and Scenic.— The general course of the Niagara is a little west of north, through a flat country from Lake Erie north for more than 20 miles. Some seven miles south of Lake Ontario, in the main parallel with it, in the Niagara region, is an abrupt declivity, approximately a prehistoric shore-line, the country north of it being some 400 feet lower than the general level to the south of it. From this escarpment to Lake Ontario the country is exceedingly fertile, famous for its peach, quince, plum, and apple orchards, and other fruits. Through this section the river flows with a slackened current, between alluvial banks. From the escarpment, southerly, the river has cut a gorge 200 to 400 feet deep, back seven miles, through which the Falls of Niagara have receded to their present position. This portion of the river is, except for a navigable mile below the Falls, a wild rapid, and includes the Niagara Whirlpool. From Lake Erie to within a mile of the upper rapids, less than two miles from the cataract, the Niagara is navigable. At the northern limits of the city of Buffalo, it branches, embracing Grand Island, area 17,381 acres (8 miles long, 6 miles wide), a township of Erie County, N. Y. The international boundary line lies in the middle of the river, following the west channel and passes through the apex or principal angle of the Horseshoe Fall. With the exception of Navy Island, which belongs to Canada, in the west channel near the foot of Grand Island, the islands belong to New York State; principal ones are Squaw, Rattlesnake, Strawberry and Cayuga, New York side; Beaver, near head of Grand Island; Buckhorn, foot of Grand Island; and Tonawanda. The Niagara receives, from the east, Gill, Cayuga, Tonawanda and Scajaquada creeks,. the last-named flowing through the city of Buffalo and making its principal Park Lake. (See BUFFALO.) From the west, the Welland is the chief tributary, an important navigable route in pioneer days, and still popular with canoeists.

The scenically famous part of the Niagara begins, on the north, at the edge of the escarpment, and runs southerly seven miles, culminating in the great cataracts. The general form of the precipice over which the river plunges is that of an irregular horseshoe, divided by Goat Island. The eastern or American Fall has nearly a straight contour line, width 1,060 feet, height 167 feet. Luna Island separates a small part of the American Fall, on the Goat Island side, from the main body. Behind this Luna Fall is the Cave of the Winds, a natural chamber eroded by the water (projected against the cliffs by air-blasts) about 100 by 75 feet in dimensions. The gorge opposite the American Fall is 1,250 feet wide. The Horseshoe or Canadian Fall, the grandest single feature of the Niagara region, was in 1890, 3,010 feet long; continued recession has no doubt increased the length; the height at the apex of the curve is 158 feet. Adjoining the cataracts on both American and Canadian sides are groups of islands, surrounded by rapids, presenting many minor features of great beauty and interest. On the American side, Green Island (formerly Bath), Goat, the Three Sisters, Little Brother, Ship, Brig, Robinson, and others (the last four named inaccessible to visitors) are included, with a strip of the mainland 106 acres in all, in the New York State Reservation. On the Canadian side, Cedar Island and the Dufferin Islands, above the great fall, are a part of the Queen Victoria Niagara Falls Park. About three miles below the Falls the river turns from northwest to northeast and at the elbow forms the Whirlpool, of greater interest to the geologist than to the casual tourist. Between the Whirlpool and the end of the gorge, points of interest are, on the New York side, the Devil's Hole, a wild ravine, lateral to the main gorge; and on the Canadian side, Niagara Glen, formerly Foster's Flats. The view from the edge of the escarpment, Canadian side, overlooking the village of Queenston and the low interval to Lake Ontario, is celebrated.

The level of Lake Ontario is 326 feet below Lake Erie; from Lake Erie to the rapids above the Falls, the descent is 10 feet; from the beginning of the rapids to edge of American Fall, 49 feet; from foot of American Fall to Lake Ontario, 100 feet. The discharge of the river is estimated at 15,000,000 cubic feet per minute, or one cubic mile per week.

On the edge of the escarpment two and one half miles east of Lewiston is the Tuscarora Indian reservation, 5,769 acres; a well-to-do farming community of descendants of the Tuscaroras who, being refugees from the South, joined the Five Nations Indians in 1715.

Geological.— The floor of Lake Erie at the mouth of the Niagara is Corniferous limestone. The dip is to the south, and as one proceeds northerly on the course of the river there are successively exposed the Onondaga and Corniferous limestones, the Salina group, including the hydraulic limestone; Niagara limestone, Clinton shales, Medina sandstones (upper gray, red, and gray quartzose), and red shales and sandstones, extending to Lake Ontario. Esti-

mates by careful students as to the time occupied by the falls in cutting the gorge from the escarpment to their present position vary from 5,000 to 50,000 years. Only since 1842 are there reliable data of recession. In that year James Hall, New York State geologist, made a trigonometrical survey of the Falls, marking the stations of observation with permanent monuments. Recent observations show that for the 48 years prior to 1890 the mean retrogression of the American Fall has been 7.68 inches per year; of the Horseshoe Fall 26.16 inches; a total area of recession for the American Fall of about three fourths of an acre, and for the Horseshoe Fall, of 6.32 acres. Erosion goes on most rapidly at the apex of the Horseshoe Fall.

Botanical.— The flora and silva of the Niagara region are remarkable only for the large number of species found in a small area. On the New York State reservation (106 acres), and in the immediate neighborhood of the river, have been found 909 species of flowering plants, ferns and other cryptogams, 758 of which are native. Goat Island (13.9 acres) is especially rich in species. Here, and at a few other stations in the vicinity, occurs *Hypericum Kalmianum*, L., which perpetuates the name of Peter Kalm, a Swedish botanist whose description of Niagara after his visit in 1750 is valuable. Among the ferns of the Niagara gorge, rare or not occurring elsewhere in Western New York, are the walking-fern, *Camptosorus rhizophyllus*, Link., *Aspidium Lonchites*, Swartz, and *Aspidium Bootii*, Tuckm., ferns whose accustomed range is a hundred miles northward: also *Pellæa gracilis*, Hook., and *P. atropurpurea*, Link. The only sassafras trees of the region grow at the Whirlpool.

History.— The world's first knowledge of Niagara Falls and river was had from Samuel de Champlain's work, 'Des Sauvages,' 1604; but Champlain never saw the cataract, basing his allusion on reports of Indians. The oft-repeated statement that Jacques Cartier, in 1535, was the first white man to hear of the Falls is disproved, it being shown that statements attributed to him, and quoted by Marc Lescarbot ('Histoire de la Nouvelle France,' 1609), are really from Champlain's work of 1604. The first known visit of white man to the Niagara region was that of Joseph de la Roche Dallion, a Franciscan, who attempted missionary work in the Niagara peninsula in October 1626, and appears to have crossed the river, from west to east, near Lewiston. Two priests of the Society of Jesus, Jean de Brébeuf and Joseph Chaumonot, visited the Indians in the Niagara region, 1640–1; the Sulpicians, François Dollier de Casson and René de Bréhant de Galinée, passed the mouth of the Niagara, July 1669; but they did not explore the Niagara, entering Lake Erie by the Grand River, to the westward. With them was René Robert Cavalier, known as La Salle, who turned back, and seems to have become familiar with the Niagara region in that year. In December 1678, La Salle again came to the Niagara, and above the Falls built the Griffon, the first craft larger than a bark canoe, to navigate the upper lakes. The Griffon sailed 7 Aug. 1679; the site where the vessel was built, near the present village of La Salle, N. Y. (pop. 661), is marked with a large boulder and bronze tablet, suitably inscribed. With La Salle was Father Louis Hennepin, a Franciscan (Recollect), whose book ('La Louisiane,' 1683) contains the first detailed description of the Falls. The first picture of Niagara Falls is in the 1704 edition of Hennepin's 'Nouvelle Découverte,' etc., first published 1697. La Salle was several times on the Niagara, as were his lieutenant Tonty and other followers of historic fame. La Salle made no permanent establishment, his attempted fort at the mouth of the river (Fort Conti), his stockade at Lewiston and house above the Falls being soon destroyed. In 1687 the Marquis de Denonville, after a campaign against the Iroquois in Central New York, came to the Niagara and built a fort at the mouth of the river, east side, called it Fort Denonville, and garrisoned it with 100 men. Sickness depleted the garrison and in 1688 the post was abandoned. No attempt to reoccupy the region was made by the French until 1719, when Chabert de Joncaire the elder built a trading hut at the present site of Lewiston. In 1725–6 Fort Niagara was built at the mouth of the river, and for 34 years it was the centre of French influence throughout a wide region, an important link in the chain of posts by which the subjects of Louis XIV. sought military and trade control of the Lakes and Ohio Valley. The original mess-house or "castle," somewhat modified, is still standing, probably the oldest building in the northern United States west of the Mohawk; two other buildings of the French period remain, adjoining. French domination on the Niagara ended 25 July 1759, when Fort Niagara and dependencies were surrendered by Captain Pouchot to Sir William Johnson.

Under the British, the Niagara was a centre of British-Indian alliance until the close of the Revolution. During the period of Pontiac's uprising, a band of Indians ambushed and massacred a British force returning from Fort Schlosser above the Falls to Fort Niagara, also a relieving force, in all about 100 men. This affair, 14 Sept. 1763, took place on the banks of the Niagara at the Devil's Hole ravine, into which many of the victims were thrown or driven alive. It was the last Indian demonstration against the British in this region. From the outbreak of the Revolutionary War parties were sent from Fort Niagara against the frontier settlements of New York and Pennsylvania. Here were planned the expeditions which resulted in the massacres of Wyoming, Cherry Valley, Bowman's Creek, and others. Sullivan's retaliatory expedition of 1779, against the Senecas of Central New York, drove in upon the British at Fort Niagara some 5,000 refugees, who became dependents on the British. To relieve this burden, the British, until the close of the war, were zealous in equipping and despatching from Fort Niagara scalping parties against the American settlers in the Mohawk, Susquehanna, and other frontier sections. Several hundred of the Senecas who fled from Sullivan, summer of 1779, settled the next spring on Buffalo Creek, thus making the first Indian village on the present site of Buffalo. (See BUFFALO.) The British maintained a garrison at Fort Niagara, and virtual control over the whole region, until 11 Aug. 1796, or for 13 years after the close of the war. During this "hold-over" period the present town of Niagara, Ont., at the mouth of the river, west side, was settled, beginning 1783, with people from the United States who re-

mained loyal to Great Britain. These United Empire Loyalists, many of them families of culture and energy, gave a high character to society in the district, still maintained by their descendants. The development of the Canadian side of the Niagara was begun earlier than that of the New York side. Lieutenant-Governor Simcoe made Niagara the capital of Upper Canada (now Ontario) in 1792, the seat of government being moved to York (Toronto) in 1796. Queenston, Canada, opposite Lewiston, was founded as West Landing, 1789, by Robert Hamilton; in 1792 named by him Queenston, in honor of Queen Charlotte.

The War of 1812 paralyzed the development of the region, and the banks of the Niagara became the theatre of the most important land conflicts of that war on the northern frontier. On 12 Oct. 1812 the Americans under Van Rensselaer attempted to gain the heights at Queenston; owing largely to cowardice and insubordination of the militia the attempt failed, and the Americans were defeated; the British commander, Gen. Isaac Brock, was killed in the engagement; Winfield Scott, of the American regulars, was taken prisoner. On 13 May 1813, the American land forces under Dearborn and naval forces under Chauncey operated together against Fort George, nearly opposite Fort Niagara. Dearborn falling ill, the command devolved upon Scott. Fort George was taken, with the nearby viliage of Newark (Niagara-on-the-Lake). The British posts at Chippewa and Fort Erie were abandoned, and the entire Canadian frontier from Lake Erie to Ontario was in the hands of the Americans. In December the British compelled the evacuation of Fort George. The American general, McClure, in retiring, blew up the fort and burned Newark. In retaliation, the British crossed the river, captured Fort Niagara, and burned and laid waste the entire American frontier, the villages of Youngstown, Lewiston and Tuscarora, culminating in the destruction of Black Rock and Buffalo, 30–31 Dec. 1813. On 3 July 1814, the Americans under Scott and Ripley captured Fort Erie. On 5 July, at Chippewa Creek, the Americans were again victors. On 25 July was fought the battle of Lundy's Lane, also called Bridgewater or Niagara Falls, overlooking the cataract. The Americans, with a total force of less than 2,600, attacked the British (4,500, with nine pieces of artillery) and carried their position. Both Brown and Scott being wounded and carried from the field, command devolved on Gen. Ripley; before morning of the 26th, the British rallied, reoccupied their position, and claimed a victory. British losses stated in official returns as 876 killed, wounded and missing; American, 861; but historians give widely varying figures. The Americans retired to Fort Erie and fortified it. On August 3 they were besieged by the British General Drummond, 1,100 men; on the 15th, during an assault, the explosion of a magazine threw the British into confusion and they withdrew with heavy loss. On 17 September the besieged Americans made a sortie, one of the most brilliant movements of its kind in military history, capturing the works of the British and forcing them to abandon the siege. This was the last important engagement of the war on the Niagara Frontier, peace being restored by the Treaty of Ghent, 24 Dec. 1814.

From 1802 the American side of the Niagara was opened for settlement under the operations of the Holland Land Company, which founded New Amsterdam, now Buffalo. Black Rock, four miles from Buffalo Creek, was merged in Buffalo in April 1853. The opening of the Erie Canal, 1825, gave great impetus to the whole region. The towns of Tonawanda (q.v.) and North Tonawanda (q.v.) owe their origin to the canal, and are now important as a point of lumber manufacture and of cargo trans-shipment from lake vessels to cars and canal-boats. Niagara Falls, N. Y. (formerly Manchester), now embracing Suspension Bridge (pop. 19,457) has evolved from its long-famous aspect of a tourist resort to a unique position among manufacturing towns. Lewiston (pop. 697), named for Gov. Morgan Lewis, on the site of La Salle's stockade of 1678, was a place of some importance prior to the railroad era, and a station on a much-traveled highway to the West. It now shares in the general immunity from business which characterizes Youngstown (pop. 547), five miles below, and Niagara and Queenston, opposite; the shipment of fruit and farm produce and the care and transportation of tourists are the chief industries of these old towns on the lower river. Fort Niagara, at the mouth of the river (reservation 288 acres), is a United States military post with modern buildings, rifle range, etc. Here are also standing several structures of the British and French periods of occupancy. The old magazine (1757) in which William Morgan was confined in 1826, for his anti-Masonic publication, is still shown. The Canadian side of the Niagara has no large town, the villages of Niagara-on-the-Lake (Ontario), Queenston opposite Lewiston, Saint David's, three miles west of Queenston, Stamford, one mile from the Whirlpool, Niagara Falls, Ont. (Drummondville), Chippewa, Bridgeburg and Fort Erie (formerly Waterloo), being either quietly rural or devoted to tourist and railroad interests.

Grand Island, a township of Erie County, a farming community, with numerous country seats, clubhouses, hotels and resorts on the shores, was the proposed site of Ararat, City of Refuge for the Jews, which Maj. Mordecai Manuel Noah zealously advocated. A cornerstone for the new city was prepared, 1825, but the project came to naught. Tonawanda Island, in the American channel opposite Tonawanda Creek, is almost wholly covered with lumber yards and mills; connected by bridge with the mainland. Navy Island (304 acres), in the Canadian channel, was the principal rendezvous of William Lyon Mackenzie and his followers during the uprising of 1837–8 known as the Upper Canada Rebellion, or Patriot War; the principal event of which on the Niagara was the burning of the steamer Caroline, in service for the rebels, by the Canadians, 29 Dec. 1837. Fort Erie village, near the ruined fort of the same name at outlet of Lake Erie, and Ridgeway, a few miles inland, were the field of exploit by the Fenians whose attempted raid into Canada was quickly suppressed, 1–12 June 1866.

Bridges.— The Niagara River is spanned by several notable bridges. The International (railway only), at Buffalo, was built by Sir Casimir Stanislaus Gzowski and Sir David L. Macpherson; begun 17 June 1871, opened for trains 3 Nov. 1873. It is of truss construction, 3,651½ feet long, supported by eight piers, three

of 197 feet span, three of 248 feet, and a double draw 362 feet long. The piers are in water from 9 to 48 feet deep, with a current varying from 5 to 12 miles an hour, the level of the river and the velocity of the current being chiefly affected by wind, which raises or lowers Lake Erie, the outlet of which is three and one half miles above the bridge. Originally of single-track width, it was widened and its capacity doubled, 1901–3. The upper steel arch bridge, below the falls, occupies the place of a suspension bridge, built 1869, destroyed by a gale in 1889, restored as a suspension bridge, and in 1895 replaced by the present structure, 1,240 feet long, height of floor above water 192 feet, width of floorway 46 feet, length of arch span 840 feet, said to be the longest bridge of its kind. One and a half miles below, spanning the gorge at the origin of the upper whirlpool rapids, is the steel cantilever bridge of the Michigan Central Railroad, built 1883; length 910 feet, height above water 245 feet; for railway only. A few rods below it is the lower steel arch bridge of the Grand Trunk Railway, which replaces the suspension bridge built by J. A. Roebling in 1858. The present structure, completed 1897, is 1,080 feet long, with a centre span 550 feet, the centre of the arch 226 feet above the water; upper track for railway, lower for carriage and foot passengers. At the north end of the gorge, between Lewiston and Queenston, a suspension bridge was erected 1899, replacing the first suspension bridge across the Niagara, built here in 1851 by Capt. E. W. Serrell, and destroyed by wind 1864. The present structure has a cable span of 1,040 feet, suspended span 800 feet, height above river 65 feet; opened for traffic 1889; one floor for foot, carriage and electric railroad traffic.

The scenery of the vicinity of the Falls was rescued from vandalism and proprietary greed by the action of New York State and the Government of the Dominion of Canada. Many enlightened minds had regretted but were powerless to stay the deterioration of the environs, long before the meeting in 1878 of Gov. Robinson of New York and Lord Dufferin, then Governor-General of Canada. To the latter is ascribed the first official expression which led to legislative action in both countries, for the preservation of Niagara. In 1884 New York State paid $1,433,429.50 for Prospect Park, adjacent lands bordering the river, Goat and other islands; which now constitute the New York State Reservation at Niagara Falls, opened to the public 15 July 1885. The wise policy of the State has been to restore the environment to a condition of nature, with as little artificial work as consists with its use and enjoyment by the public. The park is free, maintenance coming from rentals of concessions and a modest annual appropriation from the State. The park is visited by more than half a million people yearly. The Queen Victoria Niagara Falls Park, on the Canada side, embraces 154 acres in the vicinity of the falls, including the Cedar and Dufferin islands, bought by the Dominion Government in 1885 for $436,000; and also, subsequently acquired, a strip 66 feet wide along the river from Queenston to Fort Erie, about 90 acres at Niagara Glen (Foster's Flats), 100 acres at Queenston Heights, including the battle-field; and the site and ruins of Fort Erie. Franchises, especially to power plants, produce a large income.

By thus controlling the entire river front from Fort Erie to Queenston,— over 20 miles — the Dominion Government led the van for the preservation of historic sites on its frontier. At Fort Erie (built by the British under Bradstreet, 1764, present ruins dating from 1805–14), at Chippewa, and Queenston, battle-fields of the War of 1812 are preserved. On Queenston Heights is the Roman composite column in memory of Maj.-Gen. Sir Isaac Brock; a fluted shaft on a square pedestal, surmounted by a statue, the whole structure 190 feet high; a stairway of 235 steps leads to a gallery at the top. It stands 250 feet above the river; and in its vaults were reinterred, 13 Oct. 1853, the remains of Brock and of Lt.-Col. John McDonell. The shaft replaces an earlier and more modest monument, destroyed by miscreants, 16 April 1840. Near the foot of the hill is a small monument marking the spot where Brock fell; it was unveiled by Albert Edward, Prince of Wales, 18 Sept. 1860. At Lundy's Lane, near the Falls, but not included in the Government reservation, the burying ground contains numerous monuments to the soldiers who fell there. Similarly historic are the cemeteries at Niagara, Ont., Fort Niagara and Lewiston. Numerous historic sites on the American side have been marked by bronze tablets erected by the Niagara Frontier Landmarks Association.

Utilization of Power.— Competent estimates place the potentiality of the Niagara current at 7,000,000 horse-power. After many years of more or less impracticable schemes, Thomas Evershed developed a plan which became the basis of the present successful undertaking to use the power on a large scale. In June 1890 an International Niagara Commission was established, authorized to offer prizes amounting to $22,000 for the best plans for the purpose. For turbines the designs of Faesch and Piccard of Geneva were selected, and three experimental wheels were built from their plans by the I. P. Morris Co., Philadelphia. Two-phase alternating current dynamos with revolving fields were adopted; three were made and installed by the Westinghouse Company, Pittsburg. The plan included a surface canal 250 feet wide, 12 feet deep and 1,700 feet long, extending laterally from the river. Parallel with this a wheelpit was dug 425 feet long, 18½ feet wide and 178½ feet deep. This work was about a mile above the Falls. From the base of the wheelpit a tunnel was made, 18 feet 10 inches wide, 21 feet high and 6,837 feet long, emptying into the river below the Falls. For the first 5,000 feet from its lower end the grade is .7 per cent; thence to the wheelpit .4 per cent. Construction of the tunnel was begun 4 Oct. 1890. Ten turbines, each of 5,000 horse-power, were installed in the pit, steel penstocks 136 feet long and 7.5 feet diameter carrying the water to them, the great tunnel serving as tail-race. Each turbine shaft, connected with the generators above, weighs, with connected parts, 150,000 pounds, and is so supported by the upward thrust of the column of water in the penstock that it revolves without friction on its bearings. The original installation of ten wheels and dynamos was more than duplicated, 1901–2, by the construction of a new wheelpit 463 feet 8 inches long, 18½ feet wide, 178½ feet deep; connected with the old pit by a passage 130 feet below the surface. The discharge tunnel was extended 600

feet to the new pit, making the total length of the tunnel 7,437 feet. The new power-house and pit are planned for the installation of 11 turbines and dynamos, each unit of 5,000 horse-power, a total production at this point of 105,000 horse-power. The turbines in pit No. 2 are of the internal discharge type, claimed to add 10 per cent to the effective head. Two types of generators are used: (1) an external field type with nickel steel revolving magnet ring; (2) an internal revolving field type, wound for 2,300 volts, 25 cycles, 2-phase, operated at 250 revolutions per minute.

Power operations on the Canadian side were actively begun August 1902, with the construction of a plant to develop 110,000 horse-power. A notable innovation was the use of dynamos of 10,000 horse-power each. In April 1902 the Dominion Government granted rights to the Ontario Power Company, which then planned to develop 150,000 horse-power. Instead of discharging by a tunnel, the water is received in flumes, carried to the brink of the gorge and dropped to the lower river through penstocks. The first two companies to begin operations at this point were backed largely by United States capital; a third company, largely Canadian, has been granted rights, the present plans of the three companies contemplating a total production at this point of some 600,000 horse-power. The Canadian Government exacts in all cases that 50 per cent of the power developed must be supplied to Canadian consumers if called for, the rest may be exported to the United States. On the American side, in the vicinity of the power-houses, a score or more of industries have located, chiefly employing smelting, electrolytic and chemical processes, and using in the aggregate about 25,000 horse-power. The International Railway system (electric) operating throughout the whole frontier, as far east as Lockport and to stations in Buffalo, some of them 32 miles from the generators, is a notable instance of the distributed use of Niagara power, which is also largely supplied for manufacturing establishments in Buffalo and elsewhere. Far-reaching plans are made for railway operation and factory supply on the Canadian side, and great developments are predicted for the near future. At Niagara Falls, N. Y., electric power is supplemented by hydraulic power. The original power canal, built 1853–8, has been much enlarged, notably since 1892, and now has a working capacity of 100,000 horse-power. Numerous establishments relying on this system use some 20,000 horse-power, with prospective increase. The industrial growth of the Niagara region in the past decade has been great, and indications point to still greater development in the coming decade. Public apprehension that the scenic features of Niagara will be impaired by the diversion of water for power purposes, is not borne out by test observations, the variation in the flow of the cataracts due to a change of wind often being far greater than any deemed possible under present power operations.

FRANK H. SEVERANCE,
Secy. Buffalo Historical Society.

Niagara International Park, on both sides of Niagara River at Niagara Falls, a reservation for public purposes established by the joint action of the legislature of the State of New York and the parliament of the Dominion of Canada. See NIAGARA FRONTIER.

Niagara-on-the-Lake, Canada, a town of Lincoln County, Ontario, at the mouth of Niagara River, on the west bank, twelve miles below Niagara Falls, and 36 miles by water from Toronto. It is a pleasant summer resort. It was burned down in midwinter 1813, by the Irish-American General McClure during his retreat, an unnecessarily savage action that was deplored by both sides and led to cruel reprisals. Pop. (1901) 1,258.

Niagara Series, in geology, the earliest strata of the Upper Silurian era, preceding the Onondaga Series and the lower Helderberg Series. It, in turn, is subdivided into the strata of the Medina epoch, those of the Clinton group, and those of the Niagara formation. None of these three is continental in extent, but all are important, are very rich in fossils, and consist of sandstones, limestones, and shales. The Medina formation is made of Oneida conglomerate, a hard, light gray rock made up of quartz pebbles and sand, and covering Herkimer, Oneida, and Ulster counties, New York, a part of Virginia, and east Tennessee; and of Medina sandstone in western New York. The Clinton formation, shaly sandstone in New York and Pennsylvania, and more completely limestone further west, occurs in Ohio, Indiana, Wisconsin, Tennessee, Kentucky, Alabama and Georgia; and is marked by the occurrence of oolitic argillaceous hematite. The Niagara formation is a thick limestone, underlaid with shale; the wearing away of the latter undermines the limestone as at Niagara Falls. The Niagara group occurs in New Hampshire, Connecticut, Ohio, Illinois, western Tennessee, northern Kentucky, Missouri, Arkansas, and (scantily) in the Rockies. The fossils of the series are mollusks, corals, crinoids, etc.; apparently there are no land or fresh-water animals.

Niagara University, a Roman Catholic theological institution at Niagara Falls, N. Y. (q.v.), founded by the priests of the Congregation of the Mission in 1856. In 1903 there were connected with the school 22 professors and 200 students. The library contains about 13,000 volumes; the grounds and buildings are valued at $50,000. The students come from all parts of the country, and after ordination return to their respective dioceses.

Niam-Niam, nē-ām′ nē ām′. See NYAM-NYAM.

Nian'tic Indians. See NARRAGANSETT INDIANS.

Nias, nē-äs′, Dutch East Indies, an island in the Indian Ocean, off the southwest coast of Sumatra, from which it is separated by a strait 60 miles wide. It is about 70 miles long, 20 miles average breadth, area 2,100 square miles. The surface is mountainous, attaining a maximum altitude of 1,970 feet. In 1857 when the Netherlands took possession of the island, the population was reckoned at 17,000. The Niassers are of the Malay race, but fairer than the usual type. They are industrious and frugal, expert handicraftsmen, temperate and regular in their habits, but inclined to be avaricious, vindictive, and sanguinary. The chief vegetable products are rice, cocoanuts, bananas, tobacco, sugarcane, etc., and annually about 110,000 pounds of pepper. Hogs are reared, and there is a domestic

export trade with Sumatra in rice, yams, beans, and poultry. Pop. est. 200,000.

Nia'ta, or **Nata,** a breed of Argentine cattle, which long ago started among the Pampas Indians, and is now nearly or quite extinct. They were really deformed, the parts of the face being so out of proportion as to give the face a queer pug-like appearance. They were very interesting to the students of evolution as an example of a variant which maintained its peculiarities through a long period, breeding "true," and showing no reversion to the normal type.

Nibby, nēb'bē, **Antonio,** Italian antiquarian: b. Rome 1792; d. there 1839. He was one of the founders of the Academy of the Tiber and in 1814 was secretary to Louis Napoleon. He later became professor of archæology in the College of Rome and in the School of France. He wrote: 'La Grecia di Pausania' (1817–18); 'Elementi di Archæologia' (1828); 'Album di Roma' (1834); etc.

Nibelung, nē'bĕ-loong, in Scandinavian mythology, a monarch whose subjects are called Nibelungs and territory the Nibelungenland. There were two contemporary kings in this realm, against whom Siegfried, Prince of the Netherlands, fought. He slew the 12 giants who formed their paladins with 700 of their chiefs. The word Nibelungen is from *nebel* (darkness), and means the children of mist or darkness.

Nibelungen, nē'bĕ-loong-ĕn, **Ring des.** See RING DES NIBELUNGEN.

Nibelungenlied, nē'bĕ-loong"en-lēt, **The** (Song of the Nibelungen), or NIBELUNGEN NOTH (Nibelungens' Need), an ancient German epic, ranking among the noblest works of imagination. The subject of this great epic is the dreadful fate of the Burgundians, caused by the passion of two princely pairs. The one pair are Siegfried, son of King Sigismund of Santen on the Rhine, and Chriemhild, sister to Gunther, king of Burgundy; the other are Gunther and Brunhild, a heroine of the fabulous North. Siegfried — as noble a hero as ever was depicted — is beloved by Chriemhild. Her brother Gunther is enamored of Brunhild of Iceland. But the northern princess can only be won by force. A successful suitor must conquer her in combat. Gunther promises Siegfried his sister's hand if he will aid him in gaining Brunhild. Siegfried, by means of a cloak which renders him invisible, is enabled to assist Gunther in his encounter with Brunhild, whom he vanquishes and marries. On the night of her nuptials, however, Brunhild has another struggle with Gunther, in which she overcomes him. Siegfried a second time reduces her to submission, and takes from her her girdle and ring, in which lay her power. These he gives to Chriemhild, who after an interval of ten years, in a quarrel with Brunhild, shows her those trophies of her defeat. Brunhild resolves on vengeance, and persuades Hagen of Tronege to murder Siegfried, which he effects with the privity of Gunther. Chriemhild, after 13 years passed in widowhood, in pursuance of a project of vengeance marries the heathen Etzel. After another interval of 13 years, in which Chriemhild gives a son to Etzel, she invites the Burgundians or Nibelungen to the court of Etzel, involves them in strife with the Huns, and after several bloody battles both parties are destroyed. Gunther and Hagen, the sole survivors, surrender to Dietrich of Bern, an ally of Etzel, who delivers them to Chriemhild, with an injunction to spare their lives. She puts them both to death, and she in turn is killed by a vassal of Dietrich. The poem thus ends in a terrible scene of fire and bloodshed. The time in which we find the historical basis of this tragedy is about 430 or 440 A.D.; the scene is on the Rhine, and on the frontiers of Austria and Hungary. The story of the Nibelungenlied belongs to the general body of Germanic and Scandinavian mythology, and it may be traced in the myths of others of the Aryan nations. The author of the poem is not known for certain. Some have attributed it to Henry of Ofterdingen or to Klingsohr of Hungary, but recent investigations make it probable that an Austrian knight was the author (about 1140). The poem does not appear to have been so popular as some others, and after the 16th century it fell into oblivion, so remaining until 1751, when some considerable portions of it were published by Bodmer. Lachmann, in his edition of 1826, first made it the subject of scientific criticism; but his views have not been sustained by later critics. The Saint Gall text, which he regarded as a later redaction, is now considered the best, and the Nibelungenlied is regarded not as a compilation, but as an organic whole, composed by one author, who derived his materials from the rich stores of song and legend which were the common possession of the German people.

German critics speak highly of the Nibelungenlied, and prefer it in many respects to the Iliad. The language of the Iliad is, they admit, superior to that of the Nibelungenlied both as to the idiom itself and the mastership with which the Greek poet wields it, though the German epic has a childlike and venerable simplicity. On the other hand, they argue that the plan of the latter is vastly superior to that of the former. It is a great plan, from beginning to end, and embraces a whole event; the Iliad but a part of an event. The Nibelungenlied marks the culmination of the great process which had made Rome a German empire, and had transformed the invading hordes into a highly civilized people. Not only by reason of its splendid poetic and dramatic power, but also as a monument in the history of the human race, the Nibelungenlied takes rank among the great national epics of the world's literature.

Nib'lack, Albert Parker, American naval officer: b. Vincennes, Ind., 25 July 1859. He was graduated from the United States Naval Academy in 1880; served with an expedition of survey and exploration to Alaska in 1884–8; was inspector of naval militia in 1895–6; and writer and lecturer on signaling and naval tactics at the Naval War College in 1893–6. He was then naval attaché at Berlin, Vienna, and Rome till the Spanish-American War; during this war he served on the blockade of Spanish ports, being engaged in the battle of Nipe Bay. In 1898 he was transferred to the Philippines and took part in the suppression of the native insurrection; and in 1901 was appointed secretary of the naval commission in the Philippines. He has written 'The Coast Indians of Alaska and Northern British Columbia' (1889).

Nib'lo's Garden, a former theatre in New York, in Broadway, near Prince Street. It was

opened in 1838 under the name of the Sans Souci and a year later was a concert garden. Niblo's theatre was opened in 1839 and was demolished in 1895.

Nicæa, nī-sē'a, or **Nice,** Asia Minor, an ancient city, capital of Bithynia, on the east shore of Lake Ascania, 45 miles southeast of Byzantium, its site now occupied by the village of Isnik. As Ancore or Hellicore, it is said to have been colonized by Bœotians, and destroyed by the Mysians. Antigonus rebuilt it 316 B.C., and named it Antigonea; but Lysimachus, having conquered this part of Asia, changed its name to Nicæa, in honor of his wife Nicæa, daughter of Antipater. Under the Roman Empire it retained long an exalted rank among the eastern cities, and is renowned in ecclesiastical history for the famous councils held here in the reign of Constantine (325 A.D.); and by desire of the Empress Irene 785 A.D. In the year of the first council Nicæa was overthrown by an earthquake; it was restored by Valens in 368. After the foundation of the Latin Empire in Constantinople in 1204 the Greek Emperor Theodorus Lascaris made Nicæa the capital of his empire, which it continued to be until in 1261 the Greek emperors recovered Constantinople. It was finally taken by the Turks in 1330.

Nicæa, or Nice, The Council of, an ecclesiastical council held at Nicæa, in Nicomedia, in 325. Of the method of summoning the first œcumenical council Gibbon says, "The archbishop or metropolitan was empowered by the laws to summon suffragan bishops of his province, to revise their conduct, to vindicate their rights, to declare their faith, and to examine the merit of the candidates who were elected by the clergy and people to supply the vacancies of the episcopal college. The primates of Rome, Alexandria, Antioch, Carthage, and afterward Constantinople, who exercised a more ample jurisdiction, convened the numerous assembly of their dependent bishops. But the convocation of great and extraordinary synods was the prerogative of the emperor alone." Constantine before his conversion convened a council at Arles (314 A.D.). The object of the Council of Nice, likewise convened by him, was to settle the controversy which had arisen in regard to the divinity of Christ, and to contradict and condemn the views of Arius. The bishops who attended the council are variously estimated: Gibbon gives 318; Eusebius, 250; other early authorities, 300 and 320. The Eastern bishops attended in person; the Western Church was represented by seven delegates, the most important of whom was Hosius of Cordova, who attended and presided as the pope's delegate. The number of ecclesiastics of all kinds present was over 2,000. The session lasted about two months. It was frequently attended by the emperor in person. According to some accounts the earlier sittings were very stormy, and Constantine had to use much address to reconcile the disputants. Finally the council declared it to be and to have ever been the teaching of the church Catholic, in conformity with the apostolic tradition in all the churches, that Jesus Christ, the Son of God, is "consubstantial" — of the same substance or nature — with the Father: and accordingly in the creed called of Nice (otherwise the Nicæo-Constantinopolitan creed) are the words, predicated of the son of God *consubstantialis patri,* the word consubstantial being a rendering of the Greek word of precisely the same meaning and of analogous formation, *Homoousios.*

Though the membership of the Council of Nice was, as already said, almost wholly eastern, nevertheless, its president was Hosius, who represented the western empire of Rome. Gelasius, bishop of Cæsarea, in Palestine, in his history of that council writes of the presence there of Hosius and that he was the delegate of Silvester, bishop of Rome (in the Latin version, *Silvestri episcopi maximæ Romæ locum obtinebat*); and naturally enough Hosius' name is the first among the signatures of the bishops to the Council's decrees. See COUNCIL.

Nicander, nī-kăn'dėr, Greek physician and poet of the 2d century B.C. He was born in Claros, near Colophon, in Ionia; was hereditary priest of Apollo in his native city; and may have spent part of his life in Italy. He wrote various didactic poems now lost; one of these was Virgil's model for the 'Georgics,' and another the 'Heterœumena' or 'Transformations,' suggested Ovid's 'Metamorphoses.' 'Theriaca,' on dangerous wild animals, and 'Alexipharmaca' on antidotes, his two extant works, were edited by Schneider (1816 and 1792).

Nicaragua, nĭk-a-rā'gwā, or nē-kä-rä-gwä, **Republic of,** a country of Central America, bounded on the north by Honduras, on the east by the Caribbean Sea, on the south by Costa Rica, and on the southwest and west by the Pacific Ocean. Its area, according to conservative estimates, was formerly given as 40,000 square miles; including Mosquitia (see next paragraph) it is approximately 49,000 square miles.

Political Divisions.— The departments enumerated in the presidential decree of 12 Dec. 1902 were: León, Granada, Managua, Chinandega, Rivas, Masaya, Matagalpa, Carazo, Jinotega, New Segovia, Chontales, and Zelaya — the last including, for the purposes of that decree, the territories of Cape Gracias á Dios and San Juan del Norte. The strip of Caribbean coast now called Zelaya was formerly the Mosquito Reserve, or Mosquitia, a British protectorate; but Great Britain has gradually withdrawn in Nicaragua's favor her claim to exercise jurisdiction there. This eastern coast is now regarded as one of the most valuable parts of the republic; it contains gold mines, its fruit industry is already profitable, large plantations of rubber trees are being cultivated, and rosewood, cedar, and mahogany are taken from its forests.

Physical Geography.— The Sierra de los Morabios, running from the Gulf of Fonseca to the western shore of Lake Managua, appears to be the centre of volcanic energy in Nicaragua. It has the following vents: Cosigüina (famous on account of the terrific explosion of 2 Jan. 1835), Chonco, El Viejo (quiet since 1684), Santa Clara, Telica, San Jacinto, Rota, Las Pilas (eruption in 1850), Asososca, and Momotombo (eruptions in 1870 and 1886); and though only two of these may be described as active, the others are dormant, rather than extinct. This ridge is near the Pacific coast, and its southeasterly trend is continued by the isolated volcanoes Masaya (active), Apoyo (extinct),

Mombacho, Ometepe, and Madera (extinct). The two last are on an island near the western shore of Lake Nicaragua, and but a few miles from the nearest point in Costa Rica. In other words, practically the entire Pacific coast range is intensely volcanic; the only exception being found at Brito and the neighborhood southwest and south of Ometepe and Madera, where, according to the views of some geologists, the "internal fissure in the earth's crust that gave rise to the several volcanic vents of Central America" is "completely built up and healed. Hence the low gap in the grand American cordillera found at that place, which has a mean height of about 150 feet above sea-level, the lowest gap from Alaska to Tierra del Fuego." Through this gap, over this "healed fissure," the Nicaragua Canal was to have been cut. The volcanic characteristics are not found far inland, but are restricted almost entirely to the western border; nevertheless the principal cities are built in this narrow strip of land between the Pacific and the lakes. Chinandega, near the coast in the northwest, has 20,000 inhabitants; León, 45,000; Managua, capital of the republic, 30,000; Masaya, 20,000; and Granada, on the west shore of Lake Nicaragua, 25,000. Of these the largest and most beautiful city, León, contains the cathedral of St. Peter which, it is said, was built at a cost of $5,000,000 when labor was valued at 25 cents a day. From the roof of this great church can be seen in one view 13 volcanoes. In the central region the largest town is Matagalpa (4,000). The western strip, despite its insecurity and oppressive climate, has been preferred as a place of residence by the majority of the Nicaraguans on account of its facilities for communication and transportation — among which are to be reckoned the great lakes, Nicaragua (over 100 miles long) and Managua (about 35 miles), connected by a river which could, without difficulty, be rendered navigable. The greater part of the republic, stretching eastward from the lakes to the department of Zelaya, is of a different geologic formation. It is covered with a chain of mountains of moderate height, and transverse spurs which are not volcanic extrusions but Antillean folds (see CENTRAL AMERICA). Many parts of the central uplands are comparatively cool and well watered, with very rich soil and nearly untouched treasures in forest and mine; but they have remained undeveloped hitherto chiefly on account of the lack of good roads. The earthquake shocks of Nicaragua are less severe than those of Guatemala and Salvador, and dangerous fevers prevail chiefly, though not exclusively, in the lowlands or near stagnant water. The large rivers, rising in the central mountains and emptying into the Caribbean Sea, are the Segovia, also called Coca or Wanks, which forms the boundary with Honduras, the Grande, the Kurringwas, and the Bluefields, near whose mouth is the town of Bluefields (pop. about 2,000). The San Juan flows from Lake Nicaragua to the Caribbean, and in part forms the boundary with Costa Rica on the south. The route of the Caribbean section of the canal, for which the waters of the San Juan would have been utilized, included a cut through Costa Rican territory west of Ochoa.

Mineral Resources.— Among the Central American republics, Nicaragua ranks second (Honduras being first) in respect to mineral wealth. Gold and silver are found in the departments of New Segovia, Chontales, Zelaya, León, Matagalpa, and Jinotega; copper in León, New Segovia, and Matagalpa; lead and iron in New Segovia and Matagalpa; mercury, salt, sulphate of lime, sulphur, and combustible minerals in León; tin in New Segovia; nickel and zinc in Matagalpa. Up to 1903 only gold mines, or those in which gold was found mixed with silver, were worked. The principal investors were citizens of the United States.

Forests, Agriculture, and Fauna.— The forests produce rubber, mahogany, ebony, cedar, quebracho, light rosewood, mora, brazilwood, vanilla, sarsaparilla, vegetable wax, ipecacuanha, quinquina, copaiba balsam, rhubarb, etc. In many parts of the republic — near both coasts, in the valleys, on the slopes and plateaus near the lakes and rivers — soils of exceptional value for agricultural purposes are found; and though the system of cultivation is rudimentary, extraordinary results are sometimes achieved. Thus, it is said on good authority that sugarcane produces at least two annual crops, and sometimes three; cotton planted in October is picked the following February on all the western lands; the virgin soil of the eastern slope yields four crops of maize in a year; and indigo can be cut three times before replanting becomes necessary. Coffee thrives best at elevations between 2,000 and 3,000 feet above sea-level. Rice produces abundantly on central and eastern slopes. The systematic cultivation of rubber has been undertaken recently. Bananas are grown in the west, principally in the departments of León and Managua, for home consumption; in the east, on a large scale, for export. The annual yield of cacao is insufficient to supply the local demand; in quality, however, it is so excellent that it brings a higher price in the home market than the imported chocolates. Tobacco and aguardiente (made from sugarcane) are government monopolies. A large number of the coffee estates are controlled by Germans. The fauna includes the puma, deer, jaguar, monkeys, alligators, armadillos, ant-eaters, guatuso, peccaries or wild hogs, and many species of reptiles. There are large herds of cattle. Prominent among avifauna are macaws, parrots, buzzards, wild turkeys, and humming-birds.

Commerce.— Exports consist principally of coffee, rubber, bananas, coined silver, coined gold and gold in bars, gold ore and amalgam, hides, sugar, buckskin, and fine woods. Imports are: cotton goods and other tissues, firearms, provisions (dried, salted, or canned), glassware, window-glass, candles, matches, iron and steel in various forms, nails, machetes, crockery and chinaware, furniture, paints, musical instruments, agricultural implements and tools for workshops and domestic use, tanned hides, lamps, wines and liquors, and art objects. Shipments of gold in 1900 amounted to 18,500 ounces. The total foreign commerce for that year, as shown by the records of the minister of the treasury, was: exports, $2,836,557, and imports, $2,487,952. The amount of foreign merchandise imported into Nicaragua during 1902 was less in quantity and value than in any of the previous 10 years, the decline being noticed especially in the amount of British trade. Exports to the United States in the year ending 30 June 1902 were valued at $1,900,000; imports from the United States for

the same period, $1,300,000. An analysis of the foreign trade for 1901 shows percentages of exports and imports, as follows: Exports to the United States, 60 per cent, and imports from the United States, 59 per cent; to Germany, 14 per cent, and from Germany, 7 per cent; to Great Britain, 9 per cent, and from Great Britain, 20 per cent; to France, 8 per cent, and from France, 8 per cent.

Shipping, Railways, Roads, etc.— Corinto, the principal western port, has the advantage of the Pacific coast lines of steamships, American, Chilean, British, and German. Bluefields, on the eastern coast, has regular communication with the United States by means of the vessels of New Orleans and Mobile steamship companies. In November 1902 the Central Division of Nicaragua's railway system was practically completed. There is now a continuous line from the port of Corinto to Granada, and several branch lines are projected. The total system in operation is 160 miles long. In 1901 an American syndicate undertook the construction of cart roads to supply communication with Matagalpa, New Segovia, and other points in the interior; a concession was also granted to a citizen of the United States for a line of railway to connect Matagalpa with the head of navigation on the Rio Grande. There are in operation about 2,400 miles of telegraph lines. The number of post-offices was 145 in 1901.

Weights, Measures, and Money.—The metric system of weights and measures is in use. The unit of value is the silver *peso*, worth $0.384 in U. S. currency. The note circulation amounted to little more than $1,000,000 in 1900.

Government.— The presidential term is 4 years; but Gen. Zelaya, who was first elected as a result of the civil war of 1893, retained office continuously, and was in power during the term 1902–6. Constitutionally, the president shares authority with the legislature (a single house, consisting of 40 representatives elected for two years by universal suffrage), and the judiciary (supreme court of justice, two courts of appeals, and inferior tribunals); in practice, however, authorities that should be coordinate may be subordinated by an irresponsible executive (see DICTATORSHIPS IN LATIN-AMERICA). The secretaries or ministers are chiefs of the departments of Foreign Affairs and Public Instruction; War and Marine; Treasury; Public Works; and Interior, Justice, and Police.

Finances.— The revenue of the nation from January to September, 1902, amounted to 4,472,375 pesos, and authorized expenditures to 4,803,736 pesos, according to Pres. Zelaya's statement. In 1900 and 1901 public revenues exceeded public expenditure. The main sources of income are customs duties and the tax on liquor and tobacco; the largest expenditures in 1900 were for the ministry of war and marine. The foreign debt is approximately $1,350,000; in the interior in 1902 the government owed $12,000,000, "money of the country."

Population, Ethnology, and Education.— The number of inhabitants, formerly given as 360,000, is now estimated at 500,000, including Indians of Mosquitia and uncivilized natives of the interior. A very large proportion are descendants of the aborigines, and there is an admixture of African blood, especially in the east, but the white element is increasing. Though the population of Nicaragua is so much greater than that of Costa Rica, it has nevertheless a smaller number of schools. Costa Rica has twice as many teachers in her schools as soldiers in her army; Nicaragua, three times as many soldiers in her army as teachers in her schools. Instruction in the higher branches is given at two universities and ten colleges.

History.—(For some of the main events, see DISCOVERIES, CENTRAL AMERICA, and ISTHMIAN CANALS). On 21 Jan. 1522 Gil Gonzalez Dávila with four vessels sailed westward from Panama in search of the Spice Islands. Proceeding along the Pacific coast, after many mishaps, he reached the home of an Indian chief whose name was Nicaragua, and converted him to Christianity. On the same day 9,017 natives, if we may believe the commander's assertion, accepted baptism. Nicaragua's town stood on the shore of the lake to which his name has been given. Gil Gonzalez heard from the pilots he had with him that, by way of the lake and river, there was easy communication between the "North Sea" and the "South Sea"; and he wrote that only "2 or 3 leagues of very level road" separated the ocean from the lake. Until 1718 the isthmus, including the province of Nicaragua, was subject to the viceroy of Peru; after that to the Spanish representative at Bogotá. New Granada (Colombia) continued to claim certain rights in the entire isthmian territory, even up to Cape Gracias á Dios. The most interesting period is that in which occurred the invasion and temporary conquest of Nicaragua by William Walker, of Nashville, Tenn., with his 56 "emigrants." Walker became virtually dictator in 1856. His aim, disclosed to one of his associates, was to found an empire embracing Central America and Mexico (see *Bibliography*). In 1895 the short-lived "Greater Republic of Central America" was formed by the association of Nicaragua with Salvador and Honduras. It could hardly be called a genuine union.

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Nicaragua, Lake, in the republic of the same name, is situated in the southwest of Nicaragua, 110 feet above the Pacific Ocean, from which it is separated by a strip of land 12 miles wide. It is over 100 miles long from northwest to southeast, has a mean breadth of 30 miles and a maximum of 40 miles, and ranges from 50 feet to 200 feet deep. It receives the waters of Lake Managua to the northwest by the Tipitapa River, and discharges by the San Juan River into the Caribbean Sea. There are numerous islands in the lake, the largest being Ometepe, noted for its two active volcanoes. There is steamer traffic, the lake forming a link in the route across the isthmus of Central America. See CANALS and NICARAGUA for the

projected interoceanic waterway via Lake Nicaragua.

Nicaragua Wood, a bright-red dye-wood native to Nicaragua, and a species of *Cæsalpinia.* It resembles Brazil wood botanically and in its properties, but yields a smaller amount of coloring matter.

Nica'tor. See DEMETRIUS II.

Niccolini, Giovanni Battista, jō-vän'nē bät-tēs'tä nēk-kō-lē'nē, Italian dramatist: b. San Guiliano, near Pisa, 31 Oct. 1782; d. Florence 20 Sept. 1861. He studied at the University of Pisa; published his first poem in 1804; and became in 1807 professor of history and mythology in the Academy of Fine Arts in Florence. His chief writings are his patriotic tragedies and his lyric verse. Among the former are: 'Nabucco' (1819); 'Antonio Foscarini' (1827); 'Giovanni da Bocida' (1830), and 'Arnoldo da Brescia' (1843), the last a bitter attack on the Guelph party. Niccolini wrote also some volumes of criticism. The best collected edition is by Gargiolli (1862 et seq.). Consult the biography and critique by Vanucci (1866).

Nic'colite, a native arsenide of nickel, having the chemical formula NiAs. The crystals, when found, belong to the hexagonal system; but the mineral usually occurs massive. It is reddish in color, and opaque with a metallic lustre. It has a hardness of from 5 to 5.5, and a specific gravity of from 7.3 to 7.7. Niccolite occurs in Saxony, Sweden, Cornwall, Scotland, Chile, and the Argentine Republic. In North America it is found at Chatham, Conn., at Franklin Furnace, N. J., at Silver Cliff, Colo., and at Tilt Cove, Newfoundland. (Also known as "Kupfernickel," "false copper," or "devil's copper.")

Nic'colls, Samuel Jack, American Presbyterian clergyman: b. Greenfield Farm, Westmoreland County, Pa., 3 Aug. 1838. He was graduated from Jefferson College in 1857; studied theology at Western Theological Seminary, and was ordained to the Presbyterian ministry in 1860. He was subsequently pastor at Chambersburg, Pa., and chaplain of the 126th Pennsylvania volunteers in 1862, and in 1865 became pastor of the 2d Presbyterian Church, St. Louis. He was moderator of the Presbyterian General Assembly in 1872, and has published 'Women's Position in the Church,' 'The Eastern Question in Prophecy.'

Niccolo (nēk'kō-lō) **of Arezzo,** ä-rĕt'sō, Italian painter: b. Arezzo 1350; d. 1417. He worked on the sculpture of the cathedral at Florence, and executed two statues for the campanile (1383). His relief of the Virgin in the façade of the Santa Maria della Misericordia is remarkable for a freedom and elegance which point to a distinct advance in Italian sculpture.

Niccolò de' Niccoli, dā nēk'kō-lē, Italian humanist: b. Florence 1363; d. there 23 June 1437. He rendered literature most important service by ransacking Europe for manuscripts of the principal Greek and Latin works. At his death he presented to the public his library, which became the basis of the Marcian library, one of the most famous of Italy. Niccolò copied and corrected numerous MSS. with his own hand, and thus came to be regarded as the originator of textual criticism of the ancient authors.

Nice, nī'kē, a Greek goddess. See NIKE.

Nice, nēs, Asia Minor. See NICÆA.

Nice, France, a city, seaport, and health resort, capital of the department of the Alpes Maritimes, beautifully situated near the base of the Maritime Alps, on the Mediterranean, and on both sides of the Paillon or Paglione, a mountain torrent of short and rapid course, 140 miles east by north of Marseilles. It is divided into the Old Town, on the left bank of the Paglione, and the New Town, on the right. Both quarters, but more especially the New Town, have of late years been much extended. The streets of the former are mean-looking compared with those of the latter, in which there are wide streets and boulevards, and lofty and handsome houses. The quays that border the Paglione are lined with gay shops, and between these and the sea the stream is entirely covered over, leaving a wide space or square where is a handsome public casino, with a fine winter-garden, and another square adorned by a statue of Masséna in bronze. At the mouth of the stream there is a public garden, and westward along the sea-front a fine promenade bordered with handsome hotels and villas. On a pier or jetty projecting from the public garden is a fine new casino. There are no remarkable public buildings in the city. There are places of worship for English, Scotch, Germans, Russians, and Americans, natural history museum, observatory, several theatres, public library, etc. Nice possesses some silk, cotton, and paper mills; many oil-mills, and manufactories of leather, soap, liqueurs, essences, perfumery, etc. Immense quantities of flowers are grown. The harbor or port is separated from the rest of the town by the Castle Hill (320 feet), which has been laid out into beautiful grounds commanding magnificent views and crowned by the remains of an old castle. The harbor has recently been greatly improved, but it is not deep enough for the largest class of steamers. The exports by sea consist principally of olive-oil. Nice is much resorted to in winter by foreigners, particularly English. Owing to sudden changes of temperature, its climate is unsuitable for those laboring under pulmonary and bronchial complaints. Pop. (1901) 125,099. The ancient Ligurian town of Nicæa, founded by a colony of Phocæans from Massalia (Marseilles), became subject to Rome in the 2d century B.C. It was in the hands of the Saracens during the greater part of the 10th century. Then, after existing as an independent city, it acknowledged the supremacy of the Counts of Provence and the House of Savoy (1388). In 1543 it was taken and pillaged by the Turks. Later, from 1600 onward, it was repeatedly taken by the French; and they kept possession of it from 1792 to 1814. In 1860 it was ceded to France by Sardinia (Savoy). Masséna was born near the city, and Garibaldi in it. Consult: Moris, 'Nice' (1899); Nash, 'Guide to Nice' (1884).

Nice, Councils of. See NICÆA, COUNCILS OF.

Nicene (nī'sēn) **Creed,** a somewhat detailed statement of Christian doctrine used

in their liturgies by the Roman Catholic, Oriental and Anglican Churches. The first part was formulated at the Council of Nice (q.v.). The final clauses after "And I believe in the Holy Ghost" were added at the Council of Constantinople 381. See CREEDS; FILIOQUE; ARIUS.

Nicephorus, nī-sĕf'ō-rŭs, Greek historian: b. 758; d. 829. He is generally known as Nicephorus Constantinopolitanus, was secretary to the Empress Irene, and in 806 was elected patriarch of Constantinople. The violent emperor Leo V. deposed him, and he retired to a cloister in 805. To this retirement we owe his invaluable 'Chronologia Compendiaria' and 'Breviarium Historicum.'

Nicephorus I., Byzantine emperor of the first decade of the 9th century A.D.; d. 26 July 811. He is often called "Logothetes," this being his title as financial secretary to Irene, whom he succeeded on the throne October 802, thanks to a sudden revolution. His experience in finance led him to lay heavy taxes, and he sided with the iconoclastic party. These two courses won him unpopularity, which was increased by his unsuccessful foreign administration; in 803 he gave up nearly all Italy to Charlemagne; in 806 was forced to sign a humiliating peace with the Arabs; and in 811 was defeated and killed by the Bulgarians under Khan Krum.

Nicephorus II., Pho'cas, Byzantine emperor: b. 912; d. 10 Dec. 969. He was of Cappadocian descent, and, like his father, Bardas Phocas, proved himself a great general. During the reigns of Constantine VII. and Romanus II. he fought the Arabs in Asia and southern Italy, and in 961 recaptured the island of Crete from the Saracens. In 963 he returned to Constantinople after the death of Romanus II., was proclaimed emperor 16 August, and 20 September married Romanus' widow, Theophano. As emperor Nicephorus' military career was no less brilliant than before; he renewed the war against the Arabs, won all of Cilicia, and in 969 captured Antioch; and was equally successful against the Bulgarians and Macedonians. At home his heavy taxes to carry on these campaigns and his bold tampering with ecclesiastical funds aroused monks and people against him. He was assassinated by his wife's paramour and his own kinsman and general, John Tzimisces. Nicephorus was not only a general but a statesman and diplomat; witness his work 'Legatio,' edited by Pertz (1839). Consult Schlumberger, 'Nicephore Phocas' (1890).

Nicephorus III., Botonia'tes, Byzantine emperor of the 11th century. He was a general, who had grown old in the service, when in 1078 he successfully plotted against Michael VII. and became emperor. His reign of three years was filled with contention against his rivals at home and with Robert Guiscard abroad. He was forced to abdicate in favor of Alexis Comnenus in April 1081, and spent the rest of his life in a monastery.

Nicetas Acominatus, nī-sē'tas ă-kŏm-ĭ-nā'-tŭs, Byzantine historian: b. Chonæ (hence called CHONIATES) in the middle of the 12th century; d. Nicæa 1216. He was a resident and official of Constantinople up to 1204, when the city was captured and he removed to Nicæa. His excellent history of the Byzantine Empire from 1118 to 1206, completing Zonaras, is his most important work; it is edited by Bekker (1835).

Nichiren, nĭch'ĭ-rĕn, Japanese religious reformer: b. 1222 A.D.; d. 1282. He founded a Buddhistic sect, the Nichvien-shiu. He appears to have been a fanatic religionist, and to have quarreled bitterly with other sects. Two exiles were imposed upon him for his disturbances. The central doctrine of his teaching is that all life may attain to being a Buddha by repeated transmigrations. Final salvation is reached by prayer and obedience to the law. Nichiren is reverenced, but not worshipped, by his followers, whose chief shrines are at Ikegami, near Tokyo.

Nichol, nĭk'ŏl, **John,** Scottish lecturer and author: b. Montrose, Forfarshire, Scotland, 8 Sept. 1833; d. London 11 Oct. 1894. He was educated at Glasgow University and Balliol College, Oxford, being graduated with honor from the latter in 1859. From 1862 to 1889 he was professor of English literature in Glasgow University, and later lectured widely in England and Scotland on literary subjects. He visited the United States several times, and during the Civil War warmly supported the Northern cause. He prepared the article on 'American Literature' for the 'Encyclopædia Britannica,' which has been separately published; and also wrote 'Fragments of Criticism' (1860); 'Hannibal' (1872), a dramatic poem; 'Tables of European Literature and History' (1876); 'Byron' in the 'English Men of Letters' series (1880); 'Robert Burns' (1882); 'Francis Bacon, his Life and Philosophy' in 'Philosophic Classics for English Readers' (1888–9); 'Kant' (1889); and 'Carlyle' in the 'English Men of Letters' series (1892). Consult his 'Memoir' by Knight (1896).

Nichol, John Pringle, Scottish astronomer: b. Brechin, Forfarshire, 13 Jan. 1804; d. near Rothesay 19 Sept. 1859. Originally educated for the Scottish Church, he turned his attention to astronomy, and in 1836 was appointed professor of astronomy in Glasgow University, a post which he retained with great credit till his death. Among his works may be mentioned 'The Architecture of the Heavens' (1838); 'Contemplations on the Solar System' (1838); 'The Planet Neptune, an Exposition and History' (1848); 'The Stellar Universe' (1848); and the 'Planetary System' (1851). These have the merit of being written in a very attractive and interesting style, and obtained a wide popularity. He likewise edited a 'Cyclopædia of Physical Sciences' (1857).

Nicholas, nĭk'ō-las, a proselyte of Antioch, one of the seven deacons (Acts vi. 5). He is sometimes charged, though on insufficient evidence, with founding the sect of Nicolaitans alluded to in Rev. ii. 15.

Nicholas, Saint, of Myra, one of the chief saints of the Greek Church, called the "Wonder-Worker" and venerated by the Roman Catholic Church: b. Patara, province of Lycia, toward the end of the 3d century; d. Myra 6 Dec. 342. He was a bishop of Myra, imprisoned during the Diocletian persecution, and set at liberty by Constantine the Great. He is venerated in the East and West as a saint and miracle worker, the patron of little children, unwedded

maidens and sailors. In 1087 his body was translated and arrived in his native city of Patara amid great rejoicings, 9 May. His festival, the anniversary day of his death, is still kept with special ceremonies in Germany, Switzerland and the Low Countries. He is the original of the Christmas present-bringer, «Santa Claus.» Consult: Praxmarer, 'Der Heilige Nikolaus und seine Verehrung' (1894).

Nicholas, the name of five popes, as follows:

Nicholas I., Saint: b. Rome; d. there 867. He succeeded Benedict III., in 858. He was of a resolute disposition and successfully upheld the papal authority. He excommunicated Photius, patriarch of Constantinople who had usurped that see after the deposition of Ignatius by the emperor Michael III. Consult: Lämmer, 'Papst Nikolaus I. und die byzantinische Staatskirche seiner Zeit' (1857); Leroy, 'Saint Nicholas I.' (1898).

Nicholas II. (GERHARD, gĕr'härt, Fr. zhărär): b. Burgundy; d. Florence 19 July 1061. A canon of Liège he became bishop of Florence in 1046 and succeeded Stephen X. in the papal chair in 1059. He was opposed by a rival, called Benedict X., the choice of some of the Roman nobles, but being disavowed by the council of Satri, Benedict was obliged to forego his claim. Hildebrand was the counsellor of Nicholas throughout his pontificate, and through his direction a council was assembled at Rome in 1059 which restricted the papal election to the college of cardinals.

Nicholas III. (GIOVANNI GAETANO DEGLI ORSINI, jō-vän'nē gä-ā-tä'nō dā'glē ōr sē'nē): d. 1280. He came of a noble Italian family and in 1277 was elected in succession to John XXI. From the emperor, Rudolph of Hapsburg, he succeeded in obtaining the cession of Romagna and the exarchate of Ravenna and he deprived Charles d'Anjou, king of Naples, of the vicariate of Tuscany. He was succeeded by Martin IV.

Nicholas IV. (GERONIMO, jā-rō-nē'mō): b. Ascoli, Italy; d. 1292. While very young he entered the order of Saint Francis and in 1274 became its general. He was made a cardinal by Nicholas III., and bishop of Palestrina by Martin IV. and in 1288 was elected pope. He was the first Franciscan pontiff. He excommunicated James of Aragon and his followers in Sicily and promoted the claims of Charles II. of Anjou to that kingdom. His unsuccessful efforts to excite a new crusade are supposed to have hastened his death.

Nicholas V. (TOMMASO PARENTUCELLI, tōmmä'sō pä-rĕn-too-chĕl'lē): b. probably at Sarzana, near Pisa, 1397; d. 1455. He was the cardinal-bishop of Bologna and succeeded Eugenius IV. in 1447. He was one of the most learned men of his time, collected books and manuscripts, and ordered translations to be made of the Greek classics. The Vatican library was also founded by him, and he embellished Rome with numerous fine edifices. In 1328 the name of Nicholas V. was assumed by Peter de Corbario, a Franciscan whom Louis of Bavaria set up as antipope against John XXII. This ecclesiastic, however, soon made his submission, and died in 1333.

Nicholas I. Pavlovitch, czar of Russia: b. near St. Petersburg 6 July (25 June) 1796; d. St. Petersburg 2 March 1855. He was third son of Paul I. The crown was relinquished by his elder brother, Constantine, and on 24 Dec. 1825 he entered upon his reign and 3 Sept. 1826 was crowned at Moscow. On 26 Dec. 1825 the military conspiracy of the Dekabrists, which had been for several years in operation, broke out. Nicholas suppressed this revolt with great energy and personal courage; but the ultimate result was to arouse a policy of strong autocracy, based largely on the army, and bent on strictly maintaining internal peace. The civil administration was placed under military supervision; and the laws subsequently promulgated for the relief of serfdom were largely ineffective. Nicholas' foreign policy was aggressive. A war with Persia (1827–8) was concluded by a peace which gave Russia an important increase in territory; and one with Turkey (1828–9) by the peace of Adrianople which secured to Russia the eastern coast of the Black Sea, and brought about the establishment of the Grecian kingdom. In 1849 Nicholas aided Austria in the conquest of the Hungarian revolutionists. His attitude toward Turkey brought on the unfortunate Crimean war. In 1853 he demanded the protectorate over Turkish subjects of Greek religion, but the Sultan refused, and was supported by England and France. The Russian army proved to be unprepared, and was defeated at the Alma and Inkerman. Nicholas died before the end of the contest (see CRIMEAN WAR). During his reign conformity to the Orthodox Greek Church was imposed. He was probably the most prominent sovereign of his time and in many ways a rather majestic despot. Consult: Smucker, 'Nicholas I.' (1860); Lacroix, 'Histoire de la Vie et du Règne de Nicholas I.' (1864–75); Edwards, 'The Romanoffs' (1890).

Nicholas II., czar of Russia: b. St. Petersburg 18 May 1868. He was the eldest son of Alexander III. by his wife, the Danish princess Dagmar, known as czarina by the name Maria Feodorovna. His education under General Danilovitch was military; it was concluded by a trip through the East, in 1891, during which he was nearly killed by a sabre stroke from a Japanese fanatic. His father's death 1 Nov. 1894 brought him (much against his will) to the throne; he married Princess Alice of Hesse 26 Nov. 1894; and in May 1896 was crowned with great pomp at St. Petersburg. His policy he proclaimed would be the peaceful one of his father, and this is certainly proved true as regards his relations with the European powers. His visits to Vienna, Breslau, and Paris in 1896, and the visits paid him in return in 1897 by the Emperor of Austria, by William II. of Germany, and by President Faure of France have shown his willingness and the eagerness of Austria, Germany, and France that there be a peaceful European policy. Even more striking was the Czar's note to the powers, published by Count Muravieff 24 Aug. 1898, inviting them to a Peace Congress, looking to the disarmament of the Powers. The Hague Congress in 1899 was followed by another visit to Paris by the Czar 18–21 Sept. 1901 and by President Loubet's trip to St. Petersburg 20–23 May 1902, and by a Franco-Russian convention intended to offset the Anglo-Japanese entente.

Upon his accession, Nicholas II. was hailed as a liberal, if not a radical. Whether there has

been internal reform during his administration is uncertain; even the rescript in favor of religious freedom seems a doubtful reform in the eyes of some critics, who urged that although freedom is granted to all present sects the death penalty still holds for any Greek churchman who leaves the Orthodox faith for any other. How far the Emperor is personally responsible for the acts of his government is also doubtful; he is often described as the mere tool of his narrow procurator-general, Pobiedonostyeff, and sometimes as a prey to morbid melancholia and the dupe of spiritualists and quacks. The strong measures taken to Russianize Finland, and the slack treatment of those guilty of the Kishineff massacres, seem — to say the least — unlike the Czar as he was glowingly pictured at his accession. Consult: Ukhtomsky's description of the trip through the Orient (English 1896–1900), Notovitch, 'L'Empereur Nicolas II. et la Politique Russe' (1895), and Leudet, 'Nicolas II. intime' (1899).

Nicholas I. Petrovitch Njegoosh, prince of Montenegro: b. 7 Oct. 1841. He succeeded his uncle, Prince Danilo, 14 Aug. 1860. In 1862 he undertook a war against Turkey which ended in an unfavorable peace 13 September; but most of the more burdensome conditions were removed by the Powers, and his partial independence was recognized. In 1876–8 with the aid of Russia, which supplied to him provisions, money, and munitions, he waged a second and successful war against Turkey; and at the Berlin Congress he obtained a large increase in the area of his dominion and the recognition of his independent sovereignty. He gave the state a sort of constitution. He wrote several dramas and other verse.

Nicholas, Sir **Edward,** English secretary of state: b. Wiltshire, England, 4 April 1593; d. East Horsley, Surrey, England, 1 Sept. 1669. He was graduated from Queen's College, Oxford, in 1611, and in 1627–8 he was a member of Parliament. In 1641 he became secretary of state under Charles I. and nominally remained in that office until the king's execution. Upon the restoration of Charles II. in 1660 he resumed his former office, from which age compelled his resignation in 1662.

Nicholas, Wilson Cary, American soldier and legislator: b. Hanover, Va., about 1757; d. Milton, Va., 10 Oct. 1820. In 1774 he was graduated from William and Mary College, and at the beginning of the Revolutionary War joined the Continental army. He became officer in command of Washington's life guards and served in this position till 1783. He was a member of the Virginia State Convention which ratified the Constitution of the United States, and was one of those who favored ratification. In 1799 he became United States Senator, and in 1804 resigned from the Senate to become collector of the ports of Norfolk and Portsmouth. In 1807 he was elected to Congress, serving till 1814, and in the latter year was elected governor of Virginia for two years. He was one of the most influential supporters of Thomas Jefferson.

Nicholas of Clémanges. See Clémanges.

Nicholas of Cusa. See Cusa.

Nicholas of Lyra, lī'ra, called "Doctor Planus et Utilis," mediæval French monk and Biblical scholar: b. Lyre, Normandy; d. Paris 23 Oct. 1340. He entered the Franciscan order in 1291, became an instructor in theology; and later provincial of his order in Burgundy. His Hebraic and rabbinical learning was profound. His chief work is the 'Postillæ Perpetuæ' (1471–2), a running commentary on the Scriptures, which, on account of his linguistic knowledge, is on a much sounder basis than similar works of the period. It was much used by Luther; but can hardly be justly credited with the influence once ascribed to it in the rime:

> "Si Lyra non lyrasset,
> Lutherus non saltasset."

(If Lyra had not played, Luther would not have danced).

Nicholas Nickleby, nĭk'l-bĭ, a well known novel by Charles Dickens which appeared serially in 1838 and 1839. It contains in Dotheboys Hall a realistic description of the condition of cheap boarding schools of that period, and the author's strictures accomplished not a little toward reform in this direction.

Nicholasville, nĭk'ō-las-vĭl, Ky., city, county-seat of Jessamine County; on the Cincinnati, N. O. & T. P., the Louisville & N., and the Louisville & A. R.R.'s; about 10 miles south by west of Lexington and 70 miles east by south of Louisville. It was settled in 1799 and in 1835 was incorporated. It is the commercial centre of a productive agricultural region, in which tobacco is one of the chief crops, and considerable attention is given to horse-breeding. It has flour and lumber mills, tobacco storage plants, and wheel works. The Jessamine Female Institute, opened in 1854, is located here. Pop. (1890) 2,157; (1900) 2,393.

Nicholls, nĭk'ōlz, **Charlotte.** See Brontë, Charlotte.

Nicholls, Francis Tillon, American lawyer and politician: b. Donaldsonville, Ascension Parish, La., 20 Aug. 1834. He was graduated from West Point in 1855, and in 1856 served in the campaign against the Seminole Indians. He then resigned his commission in the army to study law, and was admitted to the bar in 1858, beginning his practice in Napoleonville. In 1861 he entered the Confederate army as captain, and was promoted lieutenant-colonel in the same year, and brigadier-general in 1862. He had charge of the defenses of Lynchburg, Va., and in 1864 was superintendent of the trans-Mississippi conscript bureau. After the war he resumed his law practice in Ascension Parish, La., and later removed to New Orleans (1880). In 1876 he was the Democratic candidate for governor, his party claimed the election by about 8,000 votes, but a Republican returning board declared his opponent elected. He, however, took his seat, and was subsequently recognized as governor by the Federal government. In 1888 he was again elected governor, and during his administration actively opposed the Louisiana Lottery Company, and vetoed the bill granting it a new charter with increased privileges. In 1893 he became chief justice of the Louisiana State supreme court.

Nichols, Edward Tatnall, American naval officer: b. Augusta, Ga., 1 March 1823; d. Pomfret, Conn., 12 Oct. 1886. He studied at the United States Naval Academy, became commander in 1862, in the Civil War commanded the Winona of the West Gulf squadron, and re-

ceived the surrender of Fort St. Philip 28 April 1862. In the passage of the Vicksburg batteries, also, he distinguished himself. In 1878 he reached the grade of rear-admiral, and in 1885 was retired.

Nichols, George Ward, American writer: b. Mount Desert, Maine, 21 June 1837; d. Cincinnati, Ohio, 15 Sept. 1885. He was art critic on the New York *Evening Post* under William Cullen Bryant, and was aide-de-camp to General Sherman in the Civil War. He was president of the Cincinnati College of Music for several years and greatly improved its educational and financial standing. He wrote: 'The Story of a Great March' (1865); 'Art Education Applied to Industry' (1877); 'Pottery' (1878); etc.

Nichols, Henry Ezra, American naval officer: b. New York; d. off Paranaque, Philippine Islands, 10 June 1899. He was graduated from the United States Naval Academy in 1865 and served in the navy with steady promotion. He was engaged on the Coast Survey in 1876–7 and in 1880–4, and in 1897 took command of the Bennington, which became one of Admiral Dewey's fleet in 1898. In 1899 he was transferred to the command of the monitor Monadnock and rendered valuable assistance at the capture of Paranaque. Captain Nichols was overcome by the heat during the bombardment and died while his ship was still in action.

Nichols, William Ford, American Protestant Episcopal bishop: b. Lloyd, N. Y., 9 June 1849. He was graduated from Trinity College, Hartford, Conn., in 1870, and from the Berkeley Divinity School, Middletown, Conn., in 1873. He entered the priesthood the next year and was successively rector of churches at West Hartford, Conn.; Newton, Conn.; Christ Church, Hartford (1877–87); and St. James, Philadelphia (1887–90). He declined the bishop-coadjutorship of Ohio in 1888, but in 1890 was consecrated bishop-coadjutor of California, becoming bishop of that diocese in 1893.

Nicholson, nĭk'ôl-sŏn, **Sir Francis,** English colonial governor: b. England 1660; d. London 5 March 1728. In 1684 he came to America as lieutenant in the English army and in 1688 was commissioned lieutenant-governor of New England and represented the governor, Sir Edmund Andros (q.v.) at New York. At the time of the accession of William and Mary in England and of the Leisler rebellion in New York, he was obliged to abdicate his office and return to England. (See Leisler, Jacob.) In 1690 he was appointed lieutenant-governor of Virginia, and went to Jamestown to take charge of the affairs of the colony. During his administration, which was most successful, he gave especial attention to bettering the condition of the established church and to education; he was one of the founders of William and Mary College, to which he gave £300. When Andros succeeded Lord Howard as governor of Virginia, Nicholson, disappointed that he had not received the appointment, resigned as lieutenant-governor, and was made governor of Maryland. Here he aroused opposition by changing the capital from St. Mary's to Annapolis, and also by his intolerant attitude toward the Catholics and others not connected with the Church of England. In 1698 he was appointed governor of Virginia, but failed to attain his former success in that colony. His constant menacing and tyrannical attitude aroused the opposition of the Virginians, and he particularly angered them by his removal of the capital from Jamestown to Williamsburg; he was recalled from Virginia in 1705. In 1710 he commanded an expedition against Canada and captured Port Royal, and in 1713 was made governor of Acadia. In 1719 he received his appointment as governor of South Carolina, being the first royal governor of that colony, and filled the office with ability and success. He returned to England in 1725, when he was promoted lieutenant-general. He wrote 'Journal of an Expedition for the Reduction of Port Royal' (1711); and 'An Apology or Vindication of Sir Francis Nicholson, Governor of South Carolina' (1724).

Nicholson, Henry Alleyne, English scientist: b. Penrith, Cumberland, 11 Sept. 1844; d. Aberdeen, Scotland, 19 Jan. 1899. He was educated at Göttingen and Edinburgh, was professor of natural history in the University of Toronto in 1871–4, of physical science in the Durham College of Physical Science in 1874–5, and of natural history at St. Andrews in 1875–82. From 1882 to 1899 he was regius professor of natural history at Aberdeen. He was elected F. R. S. in 1897. His chief work was done in the palæontological department of zoology. Among his writings are 'A Manual of Palæontology' (1872; 3d ed. with Lydekker 1889), 'Introduction to the Study of Biology' (1872), and many scientific papers.

Nicholson, Isaac Lea, American Protestant Episcopal bishop: b. Baltimore, Md., 18 Jan. 1844. He was graduated from Dartmouth in 1869, took priest's orders in the Episcopal Church in 1872, and held rectorships at Baltimore 1872–5; Westminster, Md., 1875–9; and St. Mark's, Philadelphia, 1879–91. He declined the bishopric of Indiana in 1883 and in 1891 was consecrated bishop of Milwaukee.

Nicholson, James, American sailor: b. Chestertown, Md., 1737; d. New York city 2 Sept. 1804. He went to sea when a boy, and was engaged in the capture of Havana in 1762. In 1776 he was given command of the Defence, fitted out by the colony of Maryland, and retook some vessels which the British had captured. In June 1776 he was assigned to the command of the Virginia of the Continental navy, and while his vessel was blockaded in Chesapeake Bay he with his crew joined the army and took part in the battle of Trenton. Later when the Virginia attempted to put to sea she went aground and was taken by the British, though Captain Nicholson and most of his crew escaped; an official inquiry acquitted him of all blame. In January 1777 he was made commander-in-chief of the Continental navy, holding that position till the close of the war. In June 1780, when in command of the frigate Trumbull, he fought a severe battle with the British ship Wyoming, without decisive result; and in August 1781 was taken prisoner in the Trumbull by the British vessels Iris and General Monk, though he made a most gallant resistance and did not surrender until his ship was completely disabled. He was exchanged shortly before the close of the war, and in 1801 was appointed commissioner of loans for the State of New York.

Nicholson, James William Augustus, American sailor: b. Dedham, Mass., 10 March 1821; d. New York 28 Oct. 1887. He entered the navy as a midshipman in 1838, served in the Mexican War, and as lieutenant under Perry on the Japan expedition. In the Civil War he commanded the steamer Isaac Smith in the operations against Port Royal (1861); in 1862 was promoted to the rank of commander, and had charge of the monitor Manhattan in the battle of Mobile Bay; and later took part in the bombardment of Fort Morgan. In 1873 he was promoted commodore, and from 1876 to 1880 was in command of the Brooklyn Navy Yard. In 1881 he was made rear-admiral and was assigned to the Mediterranean, where he protected the United States consulate during the English bombardment of Alexandria, Egypt, and had much influence in restoring order. In 1883 he was retired from active service.

Nicholson, John, British officer in India: b. Dublin 11 Dec. 1821; d. near Delhi 23 Sept. 1857. He went to India in 1839 in the employ of the East India Company; showed great bravery in the defense of Ghazni in 1841 and during the treacherous attack made by the Afghans immediately afterward; served in the commissary during the first Sikh war, and actively in the second Sikh war; and was very successful as deputy commissioner of Lahore, doing especially good service during the Mutiny. He was mortally wounded in the assault on Delhi and died nine days afterward.

Nicholson, Joseph Shield, English political economist: b. Wragby, Lincolnshire, 9 Nov. 1850. He was educated at the University of Edinburgh, at Trinity College, Cambridge, and at Heidelberg; and in 1880 became professor of political economy at Edinburgh. Among his writings on his specialty are: 'Effects of Machinery on Wages' (1878); 'The Silver Question' (1886); 'Principles of Political Economy' (1893–1901); 'Strikes and Social Problems' (1896). He wrote also some fiction, including 'Thoth' (1888); 'Toxar' (1890); and edited (1884) Adam Smith's 'Wealth of Nations.'

Nicholson, Louisa Margaret (LOUISE NIKITA), American singer: b. Philadelphia, Pa., 1872. She was educated abroad, where she made her debut in 1889 with marked success, and became prima donna at the Paris Opera in 1894. The roles in which she has achieved most success are: 'Fille du régiment'; 'Traviata'; 'Pagliacci'; etc.

Nicholson, Meredith, American author: b. Crawfordsville, Ind., 9 Dec. 1866. He entered journalism and in 1885–97 was reporter and editor on the Indianapolis *News*. In 1897–1901 he was treasurer of a coal-mining company in Denver and then returned to Indianapolis, where he has since devoted himself to literature. He has written: 'Short Flights,' verse (1891); 'The Main Chance' (1903); 'The Hoosiers' (1900); etc.

Nicholson, Reynold Alleyne, English Orientalist: b. 19 Aug. 1868. He was a son of H. A. Nicholson (q.v.). He was educated at the University of Aberdeen and at Trinity College, Cambridge, continuing his studies in Germany. He was examiner in classics at Aberdeen in 1897 and since 1901 has been professor of Persian in University College, London, and lecturer in Persian at the University of Cambridge. He has published: 'Selected Poems from the Divani Shamsi Tabriz' (1898).

Nicholson, William, English artist: b. Newark-upon-Trent 1872. He began his artistic education under Herkomer in London and completed it under Bougereau and Constant in Paris. He collaborated with James Pryde in the designing of posters, whose brilliant originality at once attracted attention and established his reputation as a great wood engraver. Among his productions the most notable are: 'An Alphabet' (1898); 'An Almanac of Twelve Sports' (1898); 'London Types' (1898); and 'Characters of Romance.' His portrait woodcuts have met with wide recognition, especially his 'Whistler'; 'Kipling'; 'Bernhardt'; 'Queen Victoria.'

Nicias, nĭsh'ĭ-ăs, Greek painter of the 4th century B.C. He was renowned for the loveliness of his woman figures in encaustic (q.v.). He was a contemporary to Apelles, the painter of Alexander the Great, and Praxiteles the sculptor, whom he assisted in coloring his statues. He is said to have invented encaustic painting.

Nicias, Athenian general in the Peloponnesian war (q.v.): d. Sicily 443 B.C. He inherited great wealth from his father, Niceratus, and, entering politics after Pericles' death, became leader of the aristocratic party and the enemy of all demagogues, notably Cleon. He won popular favor, however, by his lavish use of his wealth. His natural caution and timidity was a proverb among the comic poets of the day, and he seems to have been the prey of blackmailers. In 425 he led the troops that hemmed the Spartans in at Sphacteria; in the next year captured Cythera; in 423 was in command in Thrace; and, after Cleon's death, brought about the famous Peace of Nicias (421). Cleon's place as a leader of the war party was to a certain degree taken by Alcibiades, who won consent to his plan for the Sicilian expedition largely by his clever suggestion that Nicias, the opponent of the project, the tried general, and the well-known conservative, should be one of the commanders of the expedition. The recall of Alcibiades soon after the expedition started left matters largely in Nicias' hands. After the death of his colleague Lamachus this was less true, since the new general Demosthenes boldy urged open attack on Syracuse. Nicias saw that this would be fatal, and influenced by superstitious fear of an eclipse of the moon refused to act at all for a month. He was terribly defeated; weakly surrendered; and in spite of the promises of his enemies was put to death. He had been mortally sick throughout this trying campaign. Consult Church, 'Nicias and the Sicilian Expedition' (1899).

Nick of the Woods, a romance by Robert Montgomery Bird, M.D., published in 1837. It is a tale of Kentucky during the "dark and bloody" days, and was very popular about the middle of the 19th century. A play, founded upon this narrative, was received with boundless applause, held the stage (a certain grade of stage) for many years, and was a forerunner of the "dime novel" in stimulating a desire among boys to run away from home and go West to kill Indians. The author was taken to task by some critics who complained that he pictures the red man upon a plane far below that of the noble

savage described by Cooper and others. Bird replied that he described the cruel, treacherous, and vindictive Indian as he existed, and not the ideal creation of a novelist.

Nickel, a metallic element resembling iron in its appearance and general properties, discovered by Cronstedt in 1751 in kupfernickel (see NICCOLITE), a mineral which resembles copper ore, but from which copper cannot be extracted, and whose name appears to signify "devil's copper." Metallic nickel occurs in the form of grains along the bed of the Fraser river, and it is also a common constituent of meteorites. The commercial supply, however, is obtained by the reduction of certain nickel-bearing minerals, of which niccolite and garnierite are the most important. The latter mineral is especially valuable because it is free from cobalt, a metal with which nickel is almost always associated, and from which it can be separated only with much difficulty. Garnierite is a hydrated silicate of nickel and magnesium, of variable composition, which occurs in vast quantities in the vicinity of Noumea, New Caledonia; similar deposits also exist in Douglas County, Oregon, and Jackson County, North Carolina, and also in the province of Malaga, Spain. The New Caledonia mines are worked by a French company, which ships the nickel to Europe both as matte and as ore.

Physically, nickel is a hard, ductile, malleable metal, white in color, but with a yellowish tinge, and susceptible of a fine polish. Its specific gravity varies from 8.36 to 9.26, according to the physical treatment to which the metal has been subjected; its specific heat is about 0.109, and its specific electrical resistance is about one seventh of that of mercury. It melts at a high temperature,— probably at about 2,500° F. Next to iron and cobalt, nickel is the most magnetic substance known, the magnet attracting it very strongly, though less strongly than either of the other two metals mentioned. (For full data concerning the magnetic qualities of nickel, consult Ewing, 'Magnetic Induction in Iron and Other Metals.') Nickel is greatly used for electroplating, both for protection against rusting, and on account of the lustrous polish that can easily be given to articles coated with it. It is also largely coming into favor for the manufacture of cooking utensils. When alloyed with other metals, nickel is used for coinage, and for other purposes past enumeration. With iron it forms alloys that are collectively known as "nickel-steel," certain of these being of the highest value for the manufacture of armor plate. The nickel-iron alloys are anomalous in many respects. It has been found, for example, that although nickel and iron are two of the most highly magnetic elements known, it is possible to form alloys of these two metals alone, which are practically non-magnetic. Iron-nickel alloys are also anomalous with respect to their coefficients of expansion, and one of them in particular (known as "invar") has a coefficient of expansion which is almost inappreciable, although iron and nickel, separately, have coefficients of considerable magnitude. Chemically, nickel is a dyad. It has the chemical symbol Ni, and an atomic weight of 58.7 if O = 16, or of 58.3 if H = 1. Its most important oxids are the monoxid, NiO, and the sesquioxid, Ni_2O_3. The metal itself does not oxidize in air at ordinary temperatures, but only when strongly heated in contact with air or with steam. The monoxid, NiO, may be prepared by the direct oxidation of the metal at a high temperature in an atmosphere of steam, or by precipitating a solution of a nickel salt with caustic potash, and then heating the green nickel hydrate, $Ni(OH)_2$, which is thrown down. The monoxid is a green powder, which becomes yellow when heated, and from it the various nickel salts may be prepared. The sesquioxid, Ni_2O_3, is a black substance, and is most conveniently prepared by adding a solution of bleaching powder to a soluble nickel salt. Nickel bromide, $NiBr_2$, nickel chloride, $NiCl_2$ and nickel sulphate, $NiSO_4 + 7H_2O$, are used in medicine to a limited extent. Sulphuretted hydrogen gas precipitates nickel from acid solutions in the form of a black sulphide, having the formula NiS. (See CHEMICAL ANALYSIS.) Finely divided nickel absorbs dry carbon monoxid at 85° F., with the formation of a singular compound called "nickel carbon monoxid," having the formula $Ni(CO)_4$. This substance is a volatile liquid which freezes at 13° F. below zero, and boils at 109° F. Its vapor explodes violently when heated to 140° F., and deposits pure nickel when mixed with an inert gas and passed through a heated tube. Advantage is taken of this strange compound for the preparation of metallic nickel for chemical purposes, when great purity is essential.

Nickel Glance, a name applied to two nickel ores, one marked by the presence of arsenic, and the other by that of antimony. The first ($NiAs_2S_2$) is grayish, isomorphic or amorphous; consists of 35.5 parts nickel to 45.2 arsenic and 19.3 sulphur; and is found in Loos, Sweden, Ems, Germany, and Schladmig, Styria. The second ($NiSb_2S_2$) is a chemical analogue of the first, found in Montenarba, Sardinia, Waldenstein in Carinthia, etc. It occurs in dodecahedral and tetrahedral crystals, but more frequently is amorphous. Its color varies from bluish to steel gray.

Nickel-Steel. Following the hint offered by iron and nickel alloys in meteorites, experiments in making nickel-iron and nickel-steel began 80 years ago when Faraday and Stodart alloyed nickel and iron (1822). Further experiments, to mention only a few names, were made by Wolf in Schweinfurt (1830), by Bessemer (1858), and by John Garugee of Connecticut (1883). The first systematic and practical tests of the value of nickel-steel were made by James Riley of Glasgow in 1888–9. The experiments of C. E. Guillaume of the International Bureau of Standards reported in 1899 showed that in addition to its previously known characteristics, the most notable of which were resistance to corrosion much greater than that of carbon steel and the remarkable combination of high resistance to stresses with great malleability and ease of working, nickel-steel, if containing more than 36 per cent of nickel, has the lowest coefficient of expansion known, thus proving an invaluable material for instruments of precision. Much more widespread, of course, is the use of nickel-steel for armor plate largely adopted because of its unequaled hardness and toughness and because its loss of strength from punching is only 15 to 20 per

cent of the original strength, whereas carbon steel loses about 33 per cent when punched. A second and more important use, though apparently limited by the expense of nickel-steel, is for rails; a test made by the Pennsylvania Railroad on the Horseshoe Curve resulted so favorably in 1902 that about 10,000 tons of nickel-steel rails (3.5 per cent nickel) were ordered by the company at a cost nearly double that of the carbon steel rails. Extensive use of nickel-steel seems impossible because of the limited annual production of nickel, the world's total for 1902 being only 8,600 metric tons. However, for ordinary uses only a very small percentage of nickel is required. The alloys with larger proportions of nickel (above 36 per cent) not only have a surprisingly low coefficient of expansion, but differ from the alloys with less nickel in respect to magnetism; alloys with less than 25 per cent of nickel can be made non-magnetic or magnetic to any desired degree; between 25 and 35 per cent the alloys have magnetism varying with temperature; and above 35 or 36 per cent the magnetism stays at its maximum for ordinary temperatures.

Nicker, in Teutonic mythology, water-fairies which dwelt in rivers and lakes as well as in the sea. Mention is made of them in the poem of 'Beowulf.' The word seems originally to have been used as an indefinite name for any water-monster. Traces of it may be found in 'Old Nick,' nix, and nixy (borrowed from German *Nixe*).

Nicobar (nĭk-ō-bär') **Islands,** a group of 19 islands in the Bay of Bengal, between lat. 6° 45′ and 9° 15′ N. and lon. 93° and 94° E. with the Andamans (q.v.) to the north, forming a province of British India. The Nicobars consist of two groups — a southern group, composed of the islands Great and Little Nicobar and several smaller islets, and a northern group, separated from the southern by Sombrero Channel, about 36 miles broad. The largest island is Great Nicobar, 30 miles long by 12 miles broad, and the next Kamorta, which is the largest of the northern group. They yield cocoanuts, plantains, teak, sassafras, and pineapples. The thick forests and heavy dews render the climate unhealthy for foreigners. The cocoanut palm yields the chief food of the natives, and is almost the only tree cared for by them. The people belong to two races, an inland tribe, little civilized, who show Mongolian affinities and are regarded as indigenous, and the coast people, about 6,000 in number, who are of mixed Malay blood, but idle and lazy. They collect and export trepang and edible birds'-nests. The archipelago was occupied by Denmark, 1756–1856. In 1869 it was annexed by Great Britain, to put a stop to the piracy of the people. A penal colony for India exists at Nancovory on the island Kamorta.

Nicobar Pigeon. See PIGEONS.

Nicodemus, nĭk-ō-dē'mŭs, ruler of the Jews, that is, a member of the Sanhedrin, who belonged to the sect of the Pharisees, came to see Jesus secretly by night, and eventually after the Resurrection is traditionally said to have become one of his disciples. He protested against the injustice with which Christ was treated by the council (John vii. 50) and after the crucifixion joined with Joseph of Arimathea in giving fitting sepulture to the body of Christ. Some commentators have fancifully identified Nicodemus with the rich young man (Mark x. 17-24), but there seems to be no solid ground for the conjecture.

Nicol, nĭk'ōl, **Erskine,** Scottish artist: b. Leith, near Edinburgh, 3 July 1825. He was educated in art at the Trustees' Academy, Edinburgh, under Sir William Allan. He resided some time in Dublin, where he painted portraits and subjects of humorous genre. Here he gathered material for his numerous clever pictures of Irish peasant life, among which may be mentioned 'Donnybrook Fair' (1859); 'Paddy's Mark' (Corcoran Gallery, Washington); 'Paying the Rent' (Vanderbilt Collection, N. Y.).

Nicol Prism, a piece of apparatus invented in 1828, by William Nicol, for the production of a beam of plane-polarized light. Its operation is

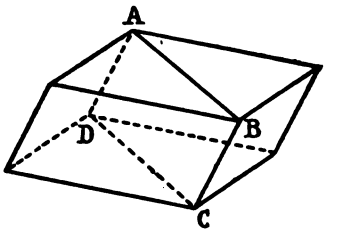


FIG. 1.

based upon the fact that when a beam of ordinary light enters a crystal of Iceland spar (crystallized calcite) from certain directions, it is decomposed into two beams, each of which is plane-polarized. One of these beams is called the "ordinary ray," and the other the "extraordinary ray"; and as the mineral exerts a different refractive power upon the two, they are divergent within the crystal. Nicol conceived the idea of introducing a surface of discontinuity within the crystal, disposed at such an obliquity that one of these rays would be totally reflected, while the other would be transmitted, and allowed to emerge from the crystal in a direction parallel to that in which the incident beam entered it. His prism is made by cutting a rhomb of Iceland spar as indicated by the plane ABCD, in Fig. 1, which passes through the obtuse angles of the crystal. The surfaces being then polished, the parts are cemented together again with Canada balsam, as shown in Fig. 2. The

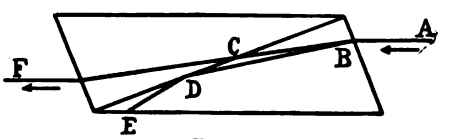


FIG. 2.

ends are ground so as to make an angle of about 68° with the length of the rhomb, and a ray of ordinary light, upon entering the crystal as indicated at AB, in Fig. 2, is separated into two rays. Both are refracted, but the "ordinary ray," BD, is refracted more than the "extraordinary" one, BC; and BD strikes the plane of section of the crystal at such an obliquity that it is totally reflected to E, while BC, striking it at a less obliquity, passes through and emerges from the crystal at F. The sides of the rhomb

are usually blackened, so that the ordinary ray is absorbed at E, and destroyed. The Nicol prism is exceedingly valuable, as it gives a beam of light that is completely polarized, and entirely without color, when the incident light is white.

Nicola, nĭk'ō-la, **Lewis,** American soldier: b. Dublin, Ireland, 1717: d. Alexandria, Va., 9 Aug. 1807. He entered the English army in 1840, rose to the rank of major, but resigned and emigrated to America, where he settled in Philadelphia. During the American Revolution his military experience was of great assistance to the Colonies, and in 1783 he became brigadier-general. It was he who wrote to Washington what is known as the 'Nicola Letter,' in which it is suggested that the latter should be made king. He wrote 'A Treatise of Military Exercise' (1776).

Nicolai, nē'kō-lī, **Christoph Friedrich,** German publisher and author: b. Berlin 18 March 1733; d. there 8 Jan. 1811. From his father he inherited in 1752 the business of the Nicolai publisning company, which he made one of the foremost in Berlin. In his youth he was a friend of Lessing and of Moses Mendelssohn, with whom he founded the 'Bibliothek der schönen Wissenschaften' (1757), a critical review, and another literary journal, the 'Briefe die neueste Litteratur betreffend' (1761). But little by little he broke with the leaders of German thought and began to attack both the critical school and the romantic movement. Goethe and Schiller replied in 'Xenien' to his parodies of 'Werther' (1775), etc. Nicolai wrote a novel with a rationalistic purpose, 'Sebaldus Nothanker' (1773), and merits praise for his excellent 'Description of a Trip through Germany and Switzerland' (1789), and for the historical value of his 'Anecdotes of Frederick II.' (1788–92). Consult the autobiography, edited by Löwe (1806) and the 'Life' by Göckingk (1820).

Nicolai, Otto, German composer: b. Königsberg, Prussia, 9 June 1810; d. Berlin 11 May 1849. He received his musical education from B. Klein of Berlin, and his first work produced in public was a 'Te Deum' performed at the Singakademie in 1833. In 1833 the Chevalier Bunsen obtained for him the post of organist at the chapel of the Prussian embassy in Rome, where he made careful study of Italian church-music. He was kapellmeister of the Court opera at Vienna 1837–9 and 1842–8, and subsequently of the Berlin opera. He founded the philharmonic concerts at Vienna for the purpose of securing worthy renderings of the Beethoven symphonies. His best-known work is his 'Die lustigen Weiber von Windsor' (libretto by S. Mosenthal), first presented at Berlin 9 March 1849, which won and maintained great success by its humorous characterization, invention, and technical skill. Consult Mendel, 'Life' (1866), which contains a list of all Nicolai's works, printed and in MS.

Nicolaief, nē-kō-lī'ĕf. See NIKOLAIEF.

Nicolaitans, nĭk-ō-lā'ĭ-tanz, a sect mentioned in Rev. ii. 6, 15, as given over to idolatrous practices and impurity of life. They thus contravened the decree of the Council of Jerusalem, Acts xv. 20–29, and were accordingly accounted heretics. There seems to be no ground for supposing that this sect was founded by Nicolas, the proselyte of Antioch, who was one of the seven deacons.

Nicolardot, Louis, loo-ē nē-kō-lär-dō, French author: b. Dijon, France, 28 Nov. 1822; d Paris, France, 21 Nov. 1888. His literary work is favorably known and among his more notable publications are: 'Journal of Louis XVI.' (1873); 'The Impeccable Theophile Gautier' (1883); 'La Fontaine and the Human Comedy' (1885); etc.

Nicolas, nĭk'ō-las, SIR **Nicholas Harris,** English antiquarian: b. Dartmouth 10 March 1799; d. near Boulogne 3 Aug. 1848. He was of French Protestant descent; served eight years in the navy (1808–16); studied law; and became the leading genealogist of his day. Hood, for instance, says that Miss Kilmansegg's ancestry «Were enough, in truth, to puzzle Old Nick, not to mention Sir Harris Nicolas.» Among his many works are: 'Notitia Historica' (1824); 'History of Agincourt' (1827); 'Proceedings and Ordinances of the Privy Council of England, 1386–1542' (1834–7); 'Despatches and Letters of Lord Nelson' (1844–6), and 'History of Royal Navy' (down to Henry V., 1847).

Nicolaus (nĭk-ō-lā'ŭs) **of Damascus,** Greek historian. He lived in the time of Herod the Great and was intimate with that monarch. He tutored the children of Antony and Cleopatra. Of his writings, a 'Universal History' in 144 books, and his biography of Augustus, fragments of great value, remain. Consult Müller 'Fragmenta Historicum Græcorum,' Vol. III., pp. 343–464.

Nicolay, nĭk'ō-lā, **John George,** American author: b. Essingen, Bavaria, 26 Feb. 1832; d. Washington, D. C., 26 Sept. 1901. He came with his family to the United States in 1838 and settled in Illinois where he was educated in the public schools. He entered the office of the *Free Press* in Pittsfield, Ill., when 16 and later became its proprietor and publisher, soon making himself a political power in the State. In 1856 he entered the office of the secretary of state at Springfield, Ill., where he became a devoted adherent of Lincoln. When the latter was elected to the presidency Nicolay was appointed his private secretary, and as the duties of the office increased John Hay (q.v.) was selected as assistant secretary. Together they formed the plan of writing a biography of President Lincoln and gained his approval of their project. In 1865 Nicolay was appointed by the President to be United States consul at Paris, where he remained until 1869, and in 1872–87 he was marshal of the Supreme Court. In 1874 he began in collaboration with John Hay 'Abraham Lincoln, a History,' published serially (1886–90), and in book form, supplemented by Lincoln's 'Complete Works' in 12 vols. (1894). He also wrote 'The Outbreak of the Civil War' (1881).

Nicole, François Léon Etienne, frăn-swä lā-ôn ā-tē-ĕn nē-kōl, Haitian poet: b. near Grande Rivière 1731; d. Cape Français 1773. Educated in a Jesuit College, he went to Paris in 1750, where Voltaire introduced him to the Encyclopedists and Louis XV. granted him a pension in recognition of his talents. In 1769 he returned to Haiti, where he was in the governor's employ. He published: 'The Romance of the

Slave' (1766); 'Tropical Flowers' (1770); and 'New Poems' (1772).

Nicole, Pierre, pē-ār, French moralist: b. Chartres 19 Oct. 1625; d. Paris 16 Nov. 1695. Graduated from the University of Paris in 1644, he was a member of the Port Royal community, held a professorship in it, wrote many of its school-books, was one of its controversialists with the Jesuits, and shared in its vicissitudes. The Abbé Goujet, who wrote his 'Life' (1732), says that he aided in the preparation of some of Pascal's 'Lettres Ecrites par Louis de Montalte' ('Provincial Letters'; 1656), and translated the series into Latin (1658). His best work is in his 'Essais de Morale et Instructions Théologiques' (25 vols. 1671 et seq.), one of which 'On the Means of Preserving Peace,' was praised rather extravagantly by Voltaire.

Nicolé, in Molière's 'Bourgeois Gentilhomme,' a servant of the Monsieur Jordain, who understands and exposes her master's follies in an amusing way.

Nicolini, nē-kō-lē'nē, **Ernesto,** French singer, whose real name was Ernest Nicolas: b. Saint-Malo 1834; d. Pau January 1898. His splendid tenor was trained at the Conservatoire. He made his début in Paris in 1857, soon afterward devoted himself to Italian opera, and Italianized his name, returned to Paris and then toured Europe. His last years were spent off the stage, because of ill-health. He married Adelina Patti in 1886.

Nicoll, nĭk'ŏl, **William Robertson,** Scottish clergyman and editor: b. Lumsden, Aberdeenshire, 10 Oct. 1851. He was educated at the University of Aberdeen, and was Free Church minister of Dufftown (1874–7) and Kelso (1877–85). He became editor of several periodicals, including the 'British Weekly,' the English 'Bookman,' the 'Expositor,' and (1900) the 'British Monthly.' Among his publications are: 'Calls to Christ' (1881); 'John Bunyan' (1884); 'Ten-Minute Sermons' (1895); 'The Key of the Grave'; 'Sunday Afternoon Verses' (1897); 'Letters on Life' (1901). He also edited 'The Expositor's Greek Testament' (1897–1900) and the complete works of Charlotte Brontë (1902).

Nicollet, nē-kō-lā, **Jean Nicolas,** French explorer: b. Cluses, Savoy, 24 July 1786; d. Washington, D. C., 11 Sept. 1843. He came to the United States in 1832 to make a scientific investigation of the southern and western States, and was later engaged by the United States government to make an exploration of the far West. He published: 'Lettre sur les Assurances qui ont pour Base les Probabiletés de la Durée de la Vie humaine' (1818); 'Mémoire sur le Mésure d'un Arc de Parallèle moyen entre le Póle et l'Équator' (1826); etc.

Nicolls, nĭk'ŏlz, **Mathias,** English colonial jurist: b. Plymouth, England, about 1630; d. Long Island, N. Y., 22 Dec. 1687. He was appointed secretary of the commission and captain under Col. Richard Nicolls, who was sent to capture New Netherlands in 1664. He became the first secretary of the province and a member of the governor's council and later was presiding judge of the court of assizes. In 1672 he was elected third mayor of New York, and in 1683 was appointed a judge of the supreme court of the colony.

Nicolls, Sir **Richard,** English colonial governor: b. Ampthill, Bedfordshire, England, 1624; d. at sea 28 May 1672. During the civil war in England he joined the king's army, was placed in command of a troop of horse, and when the royalists were defeated fled to Holland, where he entered the service of the Duke of York, serving with him in the Continental wars. On the accession of Charles II. he was appointed gentleman of the bed-chamber to the Duke of York. In 1664 the king made him the chief of a commission appointed to settle the affairs of the New England colonies and to take New Netherlands from the Dutch. He sailed from England in the same year, and after stopping at Boston for a short time reached New Amsterdam on the 25th of August. The Dutch surrendered to him without resistance; he took formal possession of the city on 8 September, the Dutch officials shortly after taking the oath of allegiance to the English king. Nicolls changed the name of the province and the city of New Amsterdam to New York; and also gave Albany its present name. In 1665 he proclaimed the 'Duke's Laws' which had been prepared under his direction; this was the first code of laws in New York, and combined features of the English law with the Roman-Dutch law formerly prevailing in the province. In the same year he gave an English form of city government to New York city. His administration was efficient, and especially moderate and considerate toward the Dutch, and he was respected and trusted by English and Dutch alike. In 1666 he successfully settled some difficulties with the French and Indians; in 1667 resigned but did not leave the colony till the arrival of his successor, Lovelace. He returned to England in 1668, and taking part in the war between England and Holland, was killed in the naval battle against De Ruyter in 1672.

Nicomachus, nĭ-kŏm'ą-kŭs, surnamed Gerasenus, Pythagorean philosopher: b. Gerasa, Palestine, about 1st century A.D. He was one of the earliest writers on mathematics and music and his name became a synonym for mathematical accuracy. "You number like Nicomachus of Gerasa" being a Philopatris proverb. He wrote a life of Pythagoras and several musical and mathematical works now lost. Enough, however, remains of his work to have greatly influenced the learning in the 15th and 16th centuries.

Nicomedia, nĭk-ō-mē'dĭ-ą, Asia Minor, an ancient city of Bithynia, its site occupied by the modern Izmid or Izmikmid (pop. 30,000), at the northeast corner of the Gulf of Izmid — the ancient Astacenus,— an arm of the Propontis or Sea of Marmora. It was named after its founder Nicomedes I. (278–250 B.C.) and was a residence of the Bithynian kings, a city of great splendor, and in later times a favorite place of resort with the emperors Diocletian and Constantine the Great. Arrian, the historian, was a native, and Hannibal committed suicide here. There are numerous interesting remains of the city.

Nicopolis, nĭ-kŏp'ō-lĭs, signifying "City of Victory," the name of many ancient cities. (1) Nicopolis in Epirus on the northern side of the Ambracian Gulf (Gulf of Arta), was built by Augustus in commemoration of his naval victory over Antony at Actium, the opposite promontory, which made him master of the Roman Em-

pire. Augustus built at the same time a temple on the neighboring hill in honor of Apollo, and instituted games to be celebrated every fifth year. It was probably the place where Saint Paul passed the last winter of his life, Titus iii. 12. Ruins of this city are still to be seen near Prevesa. (2) Now Nicopoli, a city on the Danube, in Mœsia Inferior, built by Trajan in memory of a victory over the Dacians. There is still an important town here, in the principality of Bulgaria, capital of a district of same name, 54 miles west of Rustchuk and 234 miles northwest of Constantinople. It is the seat of a Greek archbishop and a Roman Catholic bishop. Bajazet I., the Turkish emperor, gained a victory here over Sigismund, king of Hungary, in 1396; the place was taken by the Russians in 1810, 1827, and 1877. Pop. 20,000. (3) A city in Lower Egypt, a little to the east of Alexandria, built by Augustus to commemorate his final victory over Antony.

Nicot, Jean, zhŏñ nē-kō, SIEUR DE VILLEMAIN, French diplomat: b. Nîmes 1530; d. Paris 5 May 1600. He studied in Paris, was a courtier of Henry II., and acted as envoy of Francis II. to Lisbon (1560), whence he introduced tobacco into France. To this circumstance the scientific name for tobacco, *Nicotiana*, is due. Nicot wrote a French dictionary, 'Trésor de la Langue Française' (1606).

Nicotiana, nĭ-kō-shĭ-ā'na, a genus of plants of the potato family (*Solanaceæ*), represented by the two species of tobacco (*N. tabacum* and *N. rustica*). These plants abound in all their parts with poisonous elements, th· special and characteristic one in this case being the alkaloid nicotin, to which tobacco owes its peculiar narcotic properties. See TOBACCO.

Nicotin, or **Nicotine,** the characteristic alkaloid element of tobacco. For its properties and effects see TOBACCO.

Nicoya, nē-kō'yä, a gulf on the west coast of Costa Rica, extending inland north by west about 60 miles and from 20 to 30 miles in width. Along the shore are high mountains, and many picturesque inlets. Cape Blanco is at the entrance. Punta Arenas, on the east shore, is a port of entry.

Nictheroy, nē-tā-rō'ē, Brazil, a town of Rio de Janeiro, prior to 1894 the capital of the state, on Praia Grande Bay in the Bay of Rio de Janeiro, opposite the city of that name. It is noted for its elegant suburban residences. Pop. (1898) 26,000.

Nicum, nĭk'ŭm, **John,** American Lutheran clergyman: b. Winneriden, Würtemberg, Germany, 6 Jan. 1851. He was educated at Muhlenberg College, Allentown, Pa., and the Theological Seminary, Philadelphia, and, entering the ministry, held Lutheran pastorates at Philadelphia and Syracuse, and since 1887 has had charge of St. John's Lutheran Church in Rochester, N. Y. Since 1894 he has also been professor of mental and moral science in Wagner Memorial Lutheran College at Rochester. He has published: 'Gleichnisse-reden Jesu' (1884); 'Confessional History of the Lutheran Church in the United States' (1891); etc.

Niebelungen Leid. See NIBELUNGEN LIED.

Niebuhr, nē'boor, **Barthold Georg,** German historian and classical scholar, the founder of modern historical method: b. Copenhagen 27 Aug. 1776; d. Bonn 2 Jan. 1831. He was son of Karsten Niebuhr (q.v.); was educated by his father in his early youth; studied at Kiel (1794–6), at London and at Edinburgh (1798–9); and in 1880 entered the employ of the Danish government. He became director of the government's bank in 1804, and showed in this post and in the Prussian service, which he entered in 1806 much business ability, due, so he thought, to his life in England and Scotland. A quarrel with Hardenberg made Niebuhr's retirement necessary in 1810, soon after he had been engaged in financing a Prussian loan in Holland; he taught Roman history at Berlin for three years with such success that he was led to publish the first two volumes of his 'Roman History' (1811–12). But in 1813 he re-entered the Prussian government employ, took a prominent part in rousing national opposition to Napoleon; but his temper was overbearing and he soon broke with his superior, Stein. In 1816 he was sent as minister to the Vatican, brought about the understanding between Prussia and the Pope, signalized by the Bull 'De Salute Animarum' in 1821, and had his first opportunity of testing his critical theories as to early Roman history by topographical and other detail. In 1823 he retired from the diplomatic service and settled in Bonn, where he lectured on ancient and modern history. Niebuhr's great work was his destructive criticism of early Roman legend, and his reconstruction of this same period from the same mass of myth and legend; or, to put it more broadly and more truly, it was his application of this higher critical method to history. His 'Roman History' (1811–32, English version, Hare and Thirlwall, 1851), carrying the story of Rome down to the Punic Wars, was completed in an English form by Leonhard Schmitz in 'Lectures on the History of Rome from the First Punic War to the Death of Constantine' (1844). These two parts form a great collection of facts and material, and a wonderful exemplification of method, but the more popular and brilliant style of Niebuhr's pupil, Theodor Mommsen (q.v.), has made Niebuhr's work to a certain degree antiquated. He collaborated with Platner and Bunsen in their 'Description of the City of Rome'; founded with Böckh and Brandis the 'Rheinisches Museum,' a classical review; edited the 'Corpus Scriptorum Historiæ Byzantinæ'; and wrote many minor philological and historical studies, besides editing new fragments of Gaius, Cicero, and Merobaudes. His 'Stories of the Greek Heroes' ('Griechische Heroengeschichte,' 1842), originally written for his son, Marcus, is a famous juvenile. Niebuhr was a man of broad scholarship and catholic taste, as may be seen by his personal reminiscences and corespondence in Hensler's 'Lebensnachrichten über Niebuhr' (1838–9). Consult also the biographies by Classen (1876) and Eyssenhardt (1886).

Niebuhr, Karsten, German traveler, father of B. G. Niebuhr (q.v.): b. Lüdingworth, Hanover, 17 March 1733; d. Meldorf, Prussia, 26 April 1815. In 1760 he entered the Danish service as lieutenant of engineers, and in 1761 joined the expedition sent by Frederick V. of Denmark to explore Arabia. All his companions in this expedition having died within a

year after their departure, he went on alone, and in 1766 returned to Copenhagen. The works in which he gave the world the result of his expedition are remarkable for their accuracy. They include: 'Beschreibung von Arabien' (1772); 'Reisebeschreibung von Arabien und anderen umliegenden Ländern' (1774–8). Consult his son's 'Karsten Niebuhrs Leben' (1817).

Niecks, nēks, **Frederick,** Anglo-German composer and critic: b. Düsseldorf, Germany, 3 Feb. 1845. He was educated at Leipsic University and was a violinist and music teacher in his native city till 1865 when he settled in Scotland, where he was for some years engaged in teaching music, and since 1875 he has written much for musical journals. Since 1891 he has been Reid professor of music at the University of Edinburgh. He has published: 'A Concise Dictionary of Musical Terms' (1884); 'Chopin as a Man and Musician' (1888).

Niedermeyer, nē'dĕr-mī-ĕr, **Louis,** Swiss composer: b. Nyon 27 April 1802; d. Paris 14 March 1861. He studied under Moscheles in Vienna, and in Italy with Fioravanti and Zingarelli; settled in Paris; and, having met with no great success in operatic music, such as 'Marie Stuart' (1844) and 'La Fronde' (1853), devoted himself to religious music, not only composing but teaching and editing a journal called 'La Maitrise.' His opera 'Stradella' and his melody for Lamartine's 'Lac' are his best compositions of a secular sort. His training school for religious music was aided by the French government.

Niederwald, nē'dĕr-vält, Germany, the western termination of the Taunus range in the Prussian district of Wiesbaden, abutting on the Rhine opposite Bingen. On a commanding site near its summit was erected, 28 Sept. 1883, the national memorial commemorative of the successful war of 1870–1. An extended pedestal, ornamented with allegorical figures, is surmounted by a bronze figure of Germania, 34½ feet in height. The whole was designed by Schilling, a Dresden sculptor. Toothed-railways carry visitors up to the monument from the villages of Rüdesheim and Assmannshausen at the foot, both noted for their wine.

Niehaus, nē'hows, **Charles Henry,** American sculptor: b. Cincinnati, Ohio, 24 Jan. 1855. He learned his art in the Royal Academy of Munich, Germany. He was there awarded a medal. A high award was received by him at the World's Columbian Exposition. His work is seen in the Congressional Library, Washington; Trinity Church, N. Y., and the Appellate Court House, in the same city.

Niel, nē-ĕl, **Adolphe,** French marshal: b. Muret, Haute-Garonne, France, 4 Oct. 1802; d. 14 Aug. 1869. He was educated at the Ecole Polytechnique, Paris, and the Military School, Metz, and in 1835 became captain of engineers. He took part in the expedition against Constantine in Algeria 1836–7; commanded the engineers at the siege of Rome in 1849 during the revolutionary movement under Garibaldi, and as chief of engineers planned the operations against Sebastopol in 1854–5. He figured prominently at Magenta and Solferino in the Italian campaign of 1859, was made a marshal of France by Napoleon III. in return for his services, and in 1867 became minister of war.

Niel'lo Work, in art, a method of ornamentation much practised in the Middle Ages, and to which may be traced the origin of engraving. The lines of a design are cut in a piece of gold or silver; it is then covered with a black composition consisting of copper, silver, lead, and sulphur, and a little borax is sprinkled over it by subjecting it to heat over a fire, the composition becomes liquid and runs into the lines of the design; the whole is then allowed to cool, when the surface of the metal is scraped and burnished, leaving the drawing in black upon the metal. The art is still practised as a mode of ornamenting ware, but its principal use is for door-plates, plates for shop fronts, etc., in which the brass or zinc plates are engraved and the depressions filled with wax. The term is also applied to impressions in a viscid water-ink on paper from metal-plate engravings taken by the early fathers of copperplate printing for testing the state of their work. See ENGRAVING.

Niemann, nē'mān, **Albert,** German operatic tenor: b. Erxleben, near Magdeburg, 15 Jan. 1831. At first a worker in a machine factory, he became an actor in 1849; was trained in singing by Schneider, hofkapellmeister at Dessau, and by Musch, a baritone; appeared at Berlin, Stuttgart, and Königsberg; and after further study under Duprez at Paris, was made «kammersänger» to the emperor and attained great success throughout Germany. From 1866 until his retirement in 1889 he was connected with the court opera of Berlin, where he was distinguished in heroic roles. Wagner selected him to impersonate Siegmund in 'Die Walküre' at Baireuth in 1876. He appeared with success in the United States in 1887–8.

Niemen, nē'mĕn or nyĕm'ĕn, a river of Russia, with 70 miles, the lower part of its course of 500 miles, lying within the province of East Prussia, where it is called the Memel. It rises a few miles south of the city of Minsk. It is navigable to Grodno; below Tilsit it divides into two branches, which reach the Kurisches Haff each by four mouths.

Niemeyer, nē'mī-ĕr, **Felix von,** German physician, grandson of the poet and theologian August Hermann Niemeyer: b. Magdeburg 31 Dec. 1820; d. Tübingen 14 March 1871. He was educated at Halle; practised in Magdeburg 1844–55; was professor of pathology and therapeutics at Greifswald, and from 1860 at Tübingen; was military surgeon during the Franco-Prussian war; was ennobled for his services to the king of Würtemberg; and wrote a 'Text-Book of Special Pathology and Therapeutics' (1858), often republished and distinctly valuable.

Niepce, Joseph Nicéphore, zhō-zĕf nē-sā-fôr nē-ĕps, French inventor: b. Châlon-sur-Saône 7 March 1765; d. Gras, near Châlon, 5 July 1833. He served in the French army, was administrator of the district of Nice 1795–1801, then devoted himself to chemical and mechanical studies at Châlon, and from 1811 to lithography. His researches in photography began in 1813, and by 1824 he was successful in obtaining permanent impressions of the images of the *camera obscura.* In 1826 he joined Daguerre in a further prosecution of the investigations. An article of their agreement seems to

make it clear that the real credit for the discovery of photography belongs to Niepce, and that Daguerre was merely an important aid in its development. Consult Fouqué, 'La Vérité sur l'Invention de la Photographie' (1867). See also DAGUERRE; PHOTOGRAPHY.

Nietzsche, nĕtz'shĕ, **Friedrich Wilhelm,** German philosopher: b. Röcken, near Lützen, 15 Oct. 1844; d. 25 Aug. 1900. He was educated at Bonn and Leipsic, and on the recommendation of Ritschl obtained a professorship in classical philology at Basel in 1869, became known as a brilliant writer of increasingly philosophical tendency, and was compelled by troubles of eye and brain which had asserted themselves as early as 1876, to retire on a pension in 1879. For the rest of his life he lived chiefly at health-resorts, until in 1888 he was pronounced incurably insane. The circumstances of his career must be included in a judgment of his writings. He developed no system and no body of sustained thought. His works are rather a series of aphoristic presentations of unconnected and often contradictory viewpoints. Thus, he dislikes the modern democratic idea, and becomes an aristocrat; but he equally dislikes the idea of the sovereignty of the state, and is an anarchist. He denounces Schopenhauer for pessimism, but does not get beyond Schopenhauer. His is a consistent philosophy only in its universal revolt. He is an atheist and regards the consideration of aught but strength as a remnant of Christian superstition. The catalogue of Christian virtues he rejects, making his ideal the Uebermensch (Over-man), who tramples underfoot whatever he thinks may oppose him. At an early period he was an enthusiastic admirer of Richard Wagner, whom later he quite as enthusiastically attacked. So counter is Nietzsche to the best thought of the 19th century that it may be doubted if he would be much read were it not for the epigrammatic brilliance of his style. Among his works are: 'Unzeitgemässe Betrachtungen' (1873–6); 'Morgenröthe' (1881). 'Also Sprach Zarathustra' (1883–4); 'Götterdämmerung' (1888). The yast two have appeared in English renderings. There is a complete German edition (1895–1901), and an uncompleted biography by E. Förster-Nietzsche (Vol. I. 1895). Consult also Kaatz, 'Die Weltanschauung Fr. Nietzsches' (1891–2); Dolson, 'The Philosophy of Nietzsche' (1901; 'Cornell Studies in Philosophy' No. 3); Drews, 'Nietzsche's Philosophie' (1904); Blandes, 'Friedrich Nietzsche' (1888); Kronenberg, 'Nietzsche und seine Herrenmoral' (1901).

Nièvre, nē-ȧvr, France, a central department, bounded by Yonne, Cher, Allier, Saône-et-Loire, and Côte-d'Or; area, 2,658 square miles; capital, Nevers. It receives its name from the Nièvre, a small tributary of the Loire. It is generally hilly, is only of indifferent fertility, produces some good wine, and has nearly a third of its surface covered with wood. Its minerals include iron and coal, and the chief manufactures are woolen cloths, linen, cutlery, etc. Pop. (1901) 323,783.

Niflheim, nĭf'l-hīm, in Scandinavian mythology, the region of endless cold and everlasting night, ruled over by Hela.

Nigel, nĭg'ĕl, English satirist of the close of the 12th century, sometimes called WIREKER. A monk at Christ Church priory, Canterbury, he wrote various verse, the most important of his poems being the 'Speculum Stultorum,' in which as in the prose work 'Contra Curiales et Officiales Clericos,' he boldly attacked the vices of his fellow-ecclesiastics. The 'Speculum Stultorum' or 'Mirror of Fools,' with its story of the ass Burnellus who wished his tail was longer, enjoyed great popularity.

Niger, nī'jĕr, or **Joliba,** jŏl'ī-ba, a river of West Africa, the third in size of the African continent, known by various native names throughout its course, being the Joliba in its upper reach, the Mayo Balleo and Isa Eghirren in the central reach, and the Kwarra or Quorra in its lowest reach. The upper and central reaches are politically controlled by France, and the lower reach, through Northern and Southern Nigeria, by Great Britain. The Niger rises on the eastern slope of Mount Yenkina on the boundaries of Sierra Leone and Liberia, about 175 miles from the west coast, its headwaters being contiguous to those of the Senegal which flow in an opposite course. It flows northeast as far as Timbuktu, 300 miles above which it is joined by the Bani, a large tributary, and splits up into numerous diverging channels and lakes. After passing Timbuktu it flows east for 200 miles, then turns southeast through a rocky country past Say. At about 11° 40′ N., just above Ilo, it enters British North Nigeria, at Giri being joined by the Sokoto River from the east. At Boussa navigation is impeded by dangerous rapids. Finally after a long southwestern curve to Bida, it bends more to the south and is joined by a tributary of first-class size, the Benue, or Mother of Waters, a rival in volume which has come from a source 860 miles to the east. The united stream now "passes through a series of bold picturesque hills by a narrow gorge," and eventually breaks up into one of the most remarkable mangrove-covered deltas of the world. This delta, malarious and unhealthful, covers an area of about 14,000 square miles, completely intersected by branches of the river, the principal of which, the Nun, runs through the middle of the delta. The westernmost branch, the Benin, has a bar, which presents a great difficulty to navigation. Other mouths or branches are the Bonny, New Calabar, Brass, and Forcados, distributing the Niger's waters into the bights of Benin and Biafra in the Gulf of Guinea. In its course the Niger passes through much fertile valley land, while numerous towns and villages stand on its banks, and a considerable canoe commerce is prosecuted. Slaves were formerly nearly the only article of export from the Niger, but palm oil is now the principal staple, the delta outlets being known as Oil rivers. The whole course of the river is about 2,500 miles, and the area of its basin is estimated at 584,000 square miles. Mungo Park was the first European traveler to explore any part of this river (1796–7) and was drowned in the Boussa rapids. The honors of modern exploration are divided between French, British, and German travelers. Consult: Bindloss, 'In the Niger Country' (1898); Hourst, 'Sur le Niger' (1897); Mockler-Ferryman, 'Up the Niger' (1892).

Nigeria, nī-jē'rĭ-ȧ, or **Niger** (nī'jĕr) **Territories,** West Africa, an extensive British colonial possession on the lower Niger, organized

since 1900, within the boundaries arranged by the Anglo-German Agreements of 1885, 1886, and 1893, and the Anglo-French Agreements of 1889, 1890, and 1898. It comprises the Lagos Protectorate and Southern and Northern Nigeria, being bounded on the east by German Kamerun, and on the west and north by Dahomey and the French military territories. Nigeria includes the whole course of the Niger from a short distance above Ilo to its mouth, and also the left bank for a few miles higher up. The northern boundary runs irregularly eastward to a point on Lake Chad. Nigeria also includes the whole course of the Benue from a point above Yola to its confluence with the Niger at Lokoja. The coast-line extends from the Rio del Rey on the east, to near the mouth of the Benin River on the west, and thus includes all the mouths of the Niger. The total area is about 500,000 square miles; the mixed negrito population may amount to 30,000,000, chief of which are the Fulah or Fulani of the Hausa states. For administrative purposes the territory is divided into Northern and Southern Nigeria, the boundary line being drawn due east from Owo, on the Lagos frontier. The country is mainly a level or rolling plateau, but in the central districts there are mountain ranges and isolated peaks, many of them forest-clad, of considerable elevation. The Niger and the Benue are the chief rivers, the latter being especially valuable for navigation. The Gulbin-Sokoto is a perennial left-bank tributary of the Niger, and the Waube, flowing into Lake Chad, is also of some importance. The climate is tropical, with a dry (October–May) and a wet season. During the latter the rains are often extremely heavy and accompanied by severe thunderstorms. The mean annual temperature is about 80° F., but at some periods of the year the temperature in the shade may exceed 100°. The delta lands are unhealthful, and the same may be said of much of the interior, but the climate of the elevated districts is generally quite suited to Europeans. Geologically, the region is formed mainly of granite and various metamorphic rocks, but sedimentary formations, chiefly sandstones and almost entirely belonging to the older periods, are also found. Silver, tin, antimony, lead, iron, and other minerals occur. Among the vegetable and agricultural products, most of which are exported, are cotton, indigo, palm-oil, palm kernels, ground-nuts, india-rubber, ebony, camwood, gums, and coffee. Ivory and hides are also important exports, and among the native industries leather-working deserves mention. The chief towns of Southern Nigeria are: Asaba, Onicha, Akassa, Idda, Wari, Burutu, Brass, New Calabar, Bonny Opobo and Old Calabar, all ports with custom-houses; Ado and Benin. The chief towns of Northern Nigeria, which consists mainly of the former Sokoto empire and the larger part of Bornou, are: Lokoja, at the confluence of the Niger and Benue; Kano, Sokoto, Gando, Ilorin, Yakoba, Kuka, Yola, Ilo and Katsena. The greater part of Nigeria was administered by the Royal Niger Company till 1 Jan. 1900, when it was bought out by the British government. This company was formed in 1882 as the National African Company, and four years later it received its royal charter. Most of what is now Southern Nigeria was not under the rule of the company, but formed from 1884 till 1893 the Oil Rivers Protectorate, and from 1893 till 1899 the Niger Coast Protectorate. The kingdom of Benin was incorporated in the Niger Coast Protectorate in 1897. The company's abolition of the legal status of slavery, and its prohibition of the importation of spirituous liquors into Northern Nigeria, are to be maintained by the imperial government.

Consult: Bindloss, 'In the Niger Country' (1899); Mockler-Ferryman, 'British Nigeria' (1902).

Nigger Chub, or **Nigger Dick,** a dark-green chub (q.v.) of the Mississippi Valley, distinguished by the three-lobed condition of the under jaw. See CUTLIPS.

Nigger Toes. See BRAZIL NUT.

Night, in Greek mythology, Night (Nyx) was personified as a powerful goddess, who, by means of sleep exercised power over men and gods. She was the daughter of Chaos, wife of Erebus, and mother of Æther and Hemera (Day), of the Fates, Sleep, Death, Dreams, Hunger, Fear, Nemesis and Strife. By day she dwelt in Tartarus enveloped in thick clouds.

Night-ape. See DOUROUCOULI.

Night-blindness, a defect of vision; nyctalopia (q.v.). See SIGHT, DEFECTS OF.

Night-hawk, or **Bull-bat,** an American nightjar or goatsucker (*Chordeiles virginianus*). It arrives in the northern States about the end of April, and is crepuscular and nocturnal in habits, pursuing insects on the wing with great activity, and often at a great height in the air, frequently over towns and cities. It retires in the daylight hours to the woods, or an orchard, and sleeps sitting lengthwise on some large horizontal limb, or on a log, where its grayish mottled plumage, blending with the color of the old bark, makes it unnoticeable. When flying it often utters a harsh scream, and also, when dropping suddenly through the air, as it often does, it produces a strange booming sound. The night-hawk attains a length of 9 or 10 inches. It is blackish-brown on the upper parts, barred and mottled with grayish and buffy; a large wing-spot, bar across the tail and V-shaped blotch on the throat, are white in the male, but tawny or obscure in the female. The tail is forked, and is a little shorter than the wings when in repose. The gape is large and the rictal bristles are inconspicuous.

The eggs, two in number, oblong shape, and dirty bluish-white sprinkled with dark olive-brown, are produced about the middle of May, and are deposited on the bare ground in a dry situation, no nest being constructed.

Night-heron. See HERON.

Night Schools. See EVENING SCHOOLS.

Nightingale, nīt'ĭng-gāl, **Florence,** English philanthropist, best known for her work in the hospitals during the Crimean war, when she revolutionized army nursing: b. Florence 15 May 1820 she early became interested in hospital work, examined various hospitals through Europe, and was trained as a nurse by the Protestant Sisters of Mercy at Kaiserwerth-on-Rhine. In 1854 she went to the Crimea, having organized a band of trained nurses in a week, and established the great hospital at Scutari, where

she showed rare gifts of organization and heroism. Her health failed suddenly because of her severe efforts; but she refused to accept for herself the subscription of £50,000 raised for her, preferring to use it for the foundation of the Nightingale Home at Saint Thomas Hospital. She was frequently consulted by Royal Commissions in regard to field- and camp-hospitals, and gave valuable advice during the American Civil War and the Franco-Prussian war. She wrote: 'Notes on Hospitals' (1859); 'Notes on Nursing' (1860); 'Lying-In Institutions' (1871), and 'Life or Death in India' (1874). Consult Edge, 'A Woman's Example' (1864).

Nightingale, a celebrated song-bird of the family *Sylviidæ* or Warblers. The nightingale (*Daulias luscinia*) is attractive for no lustre or brilliancy of plumage, the upper parts of the body being rusty-brown tinged with olive, and the under parts pale ash, blending into white at the throat and belly. Its average length is about 6 inches. In habits the nightingale is active and lively; it frequents trees of small size and bushes, and subsists chiefly upon an insectivorous dietary. It is a migratory bird, and occurs throughout Europe, but in Great Britain is limited to certain districts, so that it is never or rarely heard in Wales nor in the most western districts of England, nor in Ireland or Scotland. The song continues until the middle of June, when the young are hatched. The male bird sings during the day, and at night also and perhaps more frequently, while the female is incubating; and the flood of song poured forth in the stillness of the evening forms one of the chief sources from which the reputation of the nightingale has been derived. The nest is of rough construction. It is generally formed of leaves and grasses, and is situated mostly in damp places or in the neighborhood of water. The eggs number from four to five, and are of an olive-green color. These birds live in confinement. The bird-catchers, if possible, take the males before the arrival of the females. Birds trapped after the pairing season are said to languish and die. Another species, formerly regarded as identical with the above, is *D. philomela,* which has a more easterly distribution, extending far into western Asia. This is the bird most often referred to in literature as the Persian bulbul; and it takes a prominent place in classic mythology. Nightingales endure captivity well and are kept as cage-birds in all parts of the world. See CAGE-BIRDS and the authorities there mentioned; consult also Newton, 'Dictionary of Birds' (1896) and the writings of British ornithologists.

Night'jar, a bird of the family *Caprimulgidæ* (q.v.). This name was first given to a single species, that common in the British Islands, on account of the jarring note it utters after dark; but most of the members of this nocturnal family produce similar sounds, and the term seems preferable in many respects to the erroneous designation "goatsuckers" traditionally applied to them in southern Europe and which should long ago have been abandoned. American representatives are the nighthawks, whippoorwills, and chuck-will's-widow, elsewhere described. The British nightjar is much like the American whippoorwill in appearance, and is known by many provincial names, such as dor-hawk, churr-owl, fern-owl, etc. Consult: Montagu, 'Dictionary of British Birds'; White, 'Natural History of Selborne.'

Night'mare, a sensation of oppression or of suffocation which sometimes occurs during sleep. The sufferer experiences a short period of intense anxiety, fear, horror, etc.; feels what seems an enormous weight on his breast; is pursued by a phantom, monster, or wild beast, which he cannot escape; is on the brink of a precipice from which he cannot remove, or is perhaps, rolling down it without being able to make any exertion for his safety; and his bodily members refuse to do their office, until he suddenly awakens himself by starting up, or by a loud cry; he is then in great terror, and the body is often covered with sweat. Nightmare is generally due to repletion and indigestion, and is often superinduced by lying on the back, especially when the head is low. A person subject to nightmare should carefully observe moderation in eating and drinking, should avoid heavy meals shortly before retiring, and likewise overrich food. Alcoholic excess may lead to nervous disorders characterized by conditions, physical and psychical, which increase liability to nightmare and similar forms of disturbance. See DELIRIUM; INCUBUS; MARA.

Nightmare Abbey, a novel by Thomas Love Peacock, the hero of which is a caricature of Shelley. It was published in 1818.

Night'shade, any of several plants of the order *Solanaceæ,* sometimes called nightshade family, especially distinguished for toxic properties, and constituting the typical genus *Solanum.* The common or black nightshade (*S. nigrum*), an annual or biennial, with erect angular stem, ovate, sinuate-dentate leaves, drooping lateral umbels of white flowers, and globose black berries, grows as a weed in waste place in most parts of the world. It is only slightly narcotic. The leaves in a fresh state are said to be injurious to animals which eat them, but seem to lose almost all narcotic property by boiling, and are used as spinach, particularly in warm climates. The berries, though generally dreaded or suspected, may also, it is said, be eaten, at least in moderate quantity, without danger. They contain, however, the alkaloid solanine found also in the shoots of the potato. Several comparatively innocuous species such as the horse-nettle or apple of Sodom (*S. carolinense*) with orange-yellow berries, are natives of the dry western portions of the United States and Canada, and one, the bittersweet, blue bindweed, felon wort, poison-flower or woody nightshade (*S. dulcamara*), is naturalized all over the eastern half of the country. (See DULCAMARA.) The deadly nightshade (see BELLADONNA) is a member of an allied genus, whose toxic principle is atropin (q.v.).

Nigid'ius Fig'ulus, Publius, Roman scholar: b. about 98 B.C.; d. 44 B.C. He took part in political affairs during the closing days of the Republic; became prætor in 59 B.C.; and having sided with Pompey in the civil war was compelled by Cæsar to live in exile. In philosophy he was a Pythagorean; and for the scope of his learning he was ranked by Aulus Gellius next to Varro (q.v.). His fame as an astrologer was great, and in the 'Chronicle' of Eusebius he is styled "Pythagoricus et magus." Gellius complains of the obscurity and

subtlety of Figulus' writings, but the examples he adduces in proof are not thought by critics to support the assertion. The fragments extant have been edited by Swoboda (1889). Consult also Röhrig, 'De Nigidio Figulo' (1887).

Nigritia, nĭ-grĭsh'ĭ-ạ. See SUDAN.

Ni'hilism, from the Latin *nihil* (a trifle, nothing), the state or condition of nihility, being nothing. A general term used to define a Russian socialistic movement, and a name also appled in metaphysics to the doctrine that refuses a substantial reality to the existences of which man is conscious. In Russia the word Nihilist was first applied by Ivan Tourgenieff to the hero of his novel 'Fathers and Sons,' who was intended to be the personification of a movement in Russia for the emancipation of women, the independence of children, and the spread of natural religion.

Doctrine of Nihilism.—Followers or believers in Nihilism are those who disbelieve in any improvement in the social condition of progress of man; particularly members of any association devoted to the work of destroying the present form of the Russian government without any hope or definite theory of substituting another government in its place. Nihilism appears to have permeated every stratum of Russian society, and its recruits and followers are gathered from every social grade, alike from the nobility, the army and the peasants.

Early History.— As early as 1818 a party of freedom, so-called, was organized in Russia, and on 14 Dec. 1825, occurred the rising of the Decembrists among the officers and soldiers of the army. These revolutionists aimed at the emancipation of the serfs and the introduction of constitutional government. The revolt was quelled, and six of the leaders were executed and 125 others imprisoned or exiled. About 1850 liberal ideas received an impetus from the study of socialistic writers of other countries. On 23 April 1849, some 40 persons were arrested who belonged to an association formed by Petrashevsky, an official of the Foreign Office. These were sentenced to death, but the sentences were commuted to imprisonment and banishment. In 1857 Alexander Hertzen founded a journal, the 'Kolokol,' in London, which had a remarkable influence upon the Russian youth. In the same year there arose in Russia a movement, under the leadership of Tschenshevsky, which criticised existing society. In 1864 he published a novel entitled 'What is to be Done?' which proved a revolutionary firebrand among the peasantry. Another writer, Shapoff, urged the introduction of self-government and local autonomy. Numerous organizations sprang up in the universities, and in 1863 the various secret associations united under the name of 'Land and Freedom.' In 1868, Bakunin commenced the publication of a newspaper in Geneva. In this journal he advocated the total abolition of the state and the substitution of small communes.

The Socialistic Propaganda.— In the early part of 1870, a number of young men and young women of the upper classes voluntarily went to work in the fields and the factories so as personally to carry on a Socialistic propaganda and distribute Socialistic literature. Their organs were the 'Forward' of London and the 'Workingman' of Geneva. This work continued about six years, during which time there were 23 political trials of 417 persons, half of whom were condemned to exile in Siberia or to hard labor in the mines. During this period there existed a more moderate party, but it failed to satisfy the demands of the young men of the universities. In 1875 the 'Narodniki' became a prominent organization. The government became active, and during 1876 and 1877 the prisons were filled with propagandists.

The Party of Removal.— In 1877, former adherents of the Nihilistic movement organized a new and stronger secret party, which aimed at the removal by force of crowned heads, and a warfare against the government. On 24 Jan. 1878, a young woman of 28, named Vera Zassulitch, shot at General Trepoff, who had caused a prisoner to be whipped for refusing to take off his hat to him. She was tried before a jury, and strangely enough, was acquitted. The government was enraged and had the verdict annulled. On 4 Aug. 1878 General Mesentzoff was killed, and 22 Feb. 1879, the Governor of Kharkov, Prince Kropotkin, was assassinated. On 2 April 1879, an attempt to assassinate the Emperor, Alexander II., was made by Solovieff. He was captured and hanged. Alexander II. (q.v.) was assassinated 13 March 1881.

The Will of the People.— Some time later at a secret congress held at Lipezk, the acquisition of political freedom was declared to be the first necessity. It was hoped to gain this by the formation of a legislative body, elected by the people, with guarantees for electoral independence, and liberty to agitate for reforms. This was demanded from Alexander III. (q.v.) shortly after the assassination of his predecessor as the price of cessation from violence. This new party, the "Narodnaia Volia," or "Will of the People," sought to overthrow despotism by the communistic instincts of the peasants. It set forth the following demands: (1) A representative assembly having supreme control in state matters; (2) provincial self-government with elective officers; (3) village communes; (4) freedom of conscience, press, speech, association, and political agitation; (5) suffrage; (6) a national militia instead of a standing army; (7) nationalization of land; (8) measures to socialize factories. This movement proved a total failure and the party collapsed in 1885.

Latter-Day Conditions.— The present condition of Nihilism in Russia has been likened to a sleeping volcano. There have been no successful outbreaks nor assassinations although the secret party is said to exist in larger numbers than ever before. Within recent years the discoveries of the police show that Nihilism is widely spreading in Russia, not only among the working classes but among the aristocracy, and even in the army, especially in Saint Petersburg, and in many of the principal cities and towns. Secret affiliations are known to exist between the Russian Nihilists and the French and Italian anarchists.

Bibliography.—Kennan, 'Siberia and the Exile System' (1891); Krapotkin, 'Memoirs of a Revolutionist' (1899); Stepniak, 'Underground Russia' (1883); Tikhomiroff, 'Russia, Political and Social' (1887); and 'Russia under the Tsars' (1885).

Nihilist, in theology, one who taught "*Christus, secundum quod est homo, nihil est,*"

that is, the human nature of Christ had no existence, so far as it could be called his. In other words Christ did not become anything different from what he was before, by assuming human nature, because no change can be wrought in the unchangeable God, and a man is not to be called a cloak because he puts one on. This was the view of Abelard, and John of Damascus, and was held to be tenable, at least, by Peter Lombard (see LOMBARD, PETER). It was condemned in the Lateran Council of 1179.

Nihongi, nē'hōn-gē, a Japanese historical work embracing records of ancient Japan. It was first issued in 712 and was fashioned on the model of Chinese histories.

Niigata, nē-ē-gä'tä, Japan, a seaport city, capital of the province of Echigo, on the west coast of the island of Hondo, nearly opposite the island of Sado, at the mouth of the Shinanogawa. It was one of the treaty ports opened in 1859, but owing to its unsuitable harbor, its foreign trade is nominal; its coasting and internal trade, however, is important and increasing, the province being rich in petroleum and minerals, and agriculture being well developed. Pop. (1898) 53,366.

Nijmegen, nī'mā-hĕn. See NIMEGUEN.

Nijne-Tagilsk, nēzh'nĕ-tä-gĭlsk', East Russia, the chief town of the Ural Mountains mining region in the government of Perm, on the Tagil, 135 miles east of Perm. Its chief industrial establishments are the ironworks founded by Demidoff; iron, gold, copper, and platinum are mined in the surrounding district, which has a population of about 30,000.

Nijni-Novgorod, nēzh'nī-nŏv'gŏ-rŏd, or **Nizhni-Novgorod** ("Lower Novgorod"), Russia, a government bounded north by the governments of Kostroma and Viatka, east by Kasan and Simbirsk, south by Penza and Tamboff, and west by Vladimir; area, 19,704 square miles. The capital is Nijni-Novgorod (q.v.). The surface forms an extensive plain, occasionally broken and diversified by low undulating hills. These hills are almost invariably composed of limestone, which is largely developed over the whole government. The only metal found is iron; gypsum prevails in every quarter. The entire government belongs to the basin of the Volga, which, entering it on the northwest, and traversing it in one vast curve to the east, drains a considerable portion of it directly, all the other drainage being brought to it by the Oka and its tributaries on the west, the Sura and its tributaries on the east, and the Senets and Vetluga on the north. The soil is of remarkable fertility, rendering this government the granary of Russia. The principal crops, in addition to the ordinary cereals, are hemp and flax. Much attention also is paid to the production of fruit. The extent of forest is equal to that of arable land, and there are tracts of excellent timber. Both manufactures and trade have made great progress. Several governments possess much larger establishments, but in none is the spirit of activity and enterprise more universal. The principal manufactures are coarse cloth, canvas, cordage, glass, soap, and leather. The same articles form important branches of trade, which includes besides corn, flour, hemp, and flax, iron and ironmongery, etc. The central position of this government, and its large navigable streams are highly favorable to its trade. Pop. (1897) 1,600,304.

Nijni-Novgorod, Nizhni-Novgorod, or simply **Nijniy,** Russia, the capital of a government of the same name, at the confluence of the Oka and Volga, 225 miles east of Moscow. It is of world-wide celebrity in connection with its great commercial fair which has been held here annually since 1816, lasts from 15 July to 1 September, and is attended by an average of 250,000 dealers and visitors, from all climes between Germany and China. There is an upper city containing the Kreml, a lower city, and a suburb. The Kreml, finely situated on the loftiest point of the high town, is surrounded by a lofty wall flanked with towers, round or square, and contains the principal edifices, particularly two cathedrals, the governor's palace, and an episcopal seminary. With the exception of these, the elegant church of the Holy Women, and a few other public edifices, the whole town is built of wood, and possesses little interest. It is, however, becoming noted, also, for its educational institutions, including schools, libraries and museums. For the convenience of those frequenting the fairs there is an enormous market hall, an electric street railroad, and 60 blocks of buildings for booths, containing more than 2,500 apartments separated by fireproof walls. The value of goods sold at one of these fairs often exceeds $90,000,000. At these fairs all foreign goods are supplied in smaller quantities, those of Russian production showing an increase. Nijni-Novgorod, founded in 1221, was devastated on several occasions by the Tartars; its prosperity dates from 1816 when the great fair was removed to Nijni-Novgorod from Makarieff, after a great fire. Pop. (1897) 95,124.

Nika Riot. See JUSTINIAN I.

Nike, nī'kē, in Greek mythology, the goddess of victory: called by the Romans Victoria. In art she is generally represented as a winged female figure. Her attributes are a palm branch, a garland and sometimes a herald's staff.

Nike Apteros, or **Athene Nike,** a small but beautiful Doric temple standing on a bastion flanking the entrance to the Athenian Acropolis. It was torn down by the Turks in the 17th century.

Nikisch, nē'kĭsh, **Arthur,** Hungarian orchestral conductor: b. Szentmiklos, Hungary, 12 Oct. 1855. He studied violin, composition and piano under Hellmesberger, Dessoff, and Schenner, respectively, in the Vienna Conservatory; was first violin in the Vienna Royal Opera orchestra for a year; and then in 1878 became musical director of the City Theatre of Leipsic. He directed the Boston Symphony Orchestra 1889–93, the Royal Hungarian Opera in Budapest 1893–5, and the Philharmonic concerts in Leipsic from that date up to the present. In Leipsic he conducts the famous Gewandhaus concerts. Nikisch wrote 'Die Christnacht,' and other music. Consult the study by Pfohl (1900).

Nikita, nē-kē'tä, **Louise.** See NICHOLSON, LOUISA MARGARET.

Nikolaieff, nē-kō-lī'ĕf, or **Nicolaiev,** Russia, a seaport, and the chief naval station on the Black Sea, at the confluence of the Ingul and Bug, 36 miles northwest of Kherson. It occupies a large space, is fortified and well built,

with wide streets and a finely planted boulevard. It is administered by a governor, who is also commander-in-chief of the Black Sea fleet. It was founded in 1791, and since its connection with the Russian railway system its trade and importance have vastly increased. Pop. (1897) 92,060.

Nikon, nē'kŏn, Russian patriarch and primate: b. 1605; d. 17 Aug. 1681. Having become a priest and a monk, he was appointed (1646) by the Czar Alexis Mikhailovitch to be archimandrite of the Novospasky monastery in Moscow. He was made metropolitan of Novgorod in 1648, and in 1652 became patriarch of Russia. In 1666 he was deposed and banished to a monastery. He died while on his way, by imperial permission, to the monastery of the Resurrection of Christ, which Nikon himself had built, and where he had gone into temporary retirement in 1658. He introduced reforms into the service of the Church, upheld monasticism, lived a life of exemplary devotion, and aimed at educational and social advancement of the people.

Nile, Battle of the. See ABUKIR.

Nile Group, a marble statue of the Alexandrine period now in the Vatican. It shows a half reclining figure of a vigorous man representing the river Nile; he leans with his left arm on a sphinx; climbing over him are naked chubby children, intended, it is supposed, to typify the height to which the flooded river rises, namely, 16 cubits. The execution of the group is fine, and the whole treatment is peculiarly Alexandrine. The group was found at Rome near the church of Minerva, in the vicinity of a temple of Isis; it was removed to the Vatican by the order of Leo. X.

Nile, a river of northeast Africa, celebrated from remote antiquity as the Egyptian Hope or Aur-Aa — Great River, the Hebrew Sihor, and the Greek Νεῖλος, the largest river of the African continent, and the second in length of the rivers of the world. Its length is estimated at 4,000 miles, and the area of its basin at 1,082,000 square miles, extending through 35 degrees of latitude, or 2,450 miles in a direct line. The White Nile or Bahr-el-Abiad flows from Victoria Nyanza, and is joined at Khartum by the Blue Nile or Bahr-el-Azrek which has its source in the Abyssinian Mountains. The principal feeder of the Victoria Nyanza and the head stream of the Nile proper is the Kagera, formed by three tributaries, the chief of which is the Nyavarongo, which rises in about 2° 30′ S. at an altitude of about 7,000 feet; the Kagera flows through a delta into Victoria Nyanza just north of 1°. Other influents are the Katonga from the west, the Nzota from the northeast, the Moroao and Ruvano from the east. The great river which flows out of Victoria Nyanza in the north at about lat. 0° 30′ N., and lon. 33° 40′ E., before its identity with the Nile was known, was called the Kari or Somerset River. At its outflow from the lake it forms the unimportant Ripon Falls, then flows northwest, and about lat. 1° 40′ N. expands into Lake Ibrahim Pasha, discovered in 1874. On again contracting to the dimensions of a river it flows first west then northeast to lat. 2° 15′ N., where it forms the Falls of Karuma. It then turns west, and after forming the Murchison Falls, enters, at the town of Magungo, the Albert Nyanza, at an elevation of about 2,550 feet. Magungo lies on the east side of the lake, close to its northeastern extremity, and exactly at this latter point, about lat. 2° 35′ N. and lon. 31° 22′ E., the river again leaves the lake, flowing in a northerly direction. Above Gondokoro, a town lying about lat. 5° N., the river forms a series of cataracts, and till 1876 the part of the river lying between these cataracts and the Albert Nyanza was never fully explored. In that year under the direction of Colonel Gordon a steamer was carried in pieces round the cataracts to Dufile, and on 7 March Romolo Gessi started thence to sail up the river, and on the 18th of the same month reached the Albert Nyanza. The whole of this part of the river, 164 miles long, is navigable, deep, and broad, in many places with a breadth of upward of 700 yards.

Not far below Gondokoro, which is nearly due north of the outlet of the Albert Nyanza, the Nile begins to flow more to the west till it reaches lat. 9° N., where it receives the Bahr-el-Ghazal, the most important of the tributaries that flow into it from the left bank. On receiving this affluent it turns due east for about 100 miles, and then after receiving the Sobat from the southeast, a very important river draining the country between Abyssinia and the Victoria Nyanza, flows almost due north to Khartum. Here it is joined from the east by the Blue Nile or Bahr-el-Azrek, the source of which was discovered by Bruce in 1770 in the Abyssinian highlands, in lat. 11° N.; lon. 36° 30′ E. It flows first north into Lake Dembea or Tsana, then emerges from it in an easterly direction, describes a great arc to the south, extending below lat. 10° N., then turns to the west, after some distance receives its southern tributary, the Dedhesa, and lastly takes a northerly course. After receiving from the east the rivers Dender and Rahad, it joins the White Nile at Khartum. The united Nile then flows first to the northeast till at lat. 17° 30′ N. it receives its last tributary, the Atbara, from the Abyssinian frontier. From its junction with the Atbara the Nile flows north, having on the west or left bank the desert of Bahiúda; on the east Mekheyr, which is commonly called Berber. Lower down it forms several islands, one of which bears the name of Kandake (Candace), and also one or more cataracts, it then bends west by south, and passes by Jebel Barkal, where stand the remains of a temple, repaired by Tirhaka (700 B.C.), but probably 1,000 years older. Resuming its northern course it enters the plains of Dongola, and forms several islands of great extent. Quitting these plains by a cataract the river flows through the districts of Mahas, Sukkot, Wadi, Kenúz, and Batn-el-Hajar (or the Glen of Rocks), at the head of which is the second or great cataract, and entering Egypt at Philæ — the Pi-lakh or limit of the Egyptians — it descends the lowest (in ascending the first) cataract to Syene or Assouan, which is in lat. 24° 5′ N. From Philæ, lat. 24° 3′ N., the Nile flows through Egypt in a single stream as far as Batn-el-Bakara, the ancient Cercasorum, at the head of the Delta, in lat. 30° 15′, where it divides into two branches, leading down respectively to Rashid (Rosetta) and Dimyat (Dam-

ietta), and entering the sea in about lat. 31° 35′ N. These two mouths correspond, as is supposed, to the Phatnitic and Bolbitinic mouths of the ancients, which, however, in ancient times were not so important as the Pelusian mouth on the east and the Canopic on the west, between which, proceeding from east to west, there were other five mouths, named respectively the Tanitic, Mendesian, Phatnitic or Bucolic, Sebennitic, and Bolbitinic.

The Nile received divine honors from the Egyptians, and at a later period also from the Greeks and Romans. By the Egyptians he was represented as a hermaphrodite, with a beard and woman's breasts, and a skin of a blue color. The Upper Nile was distinguished from the lower by a peculiar floral symbol. The Nile had a temple dedicated to himself at Nilopolis, and his principal festival is mentioned under the name of Niloa. In Greek and Roman art he is depicted in the attitude of a river god reclining, around whom sport 16 children, an allegorical representation of the height in cubits of the inundations of the river.

As rain scarcely ever falls in the valley of the Nile from the 18th nearly to the 30th parallel, and very scantily even lower down, the river owes its supplies wholly to the copious rains of the countries wherein it rises. In Egypt it begins to increase in June, attains its greatest height in three months, and then subsides as gradually as it rose. The ordinary rise at Cairo is about 25 feet. During the flood a great portion of the Delta and of the valley of Egypt higher up, is inundated. In Sennaar also, and Dongola, extensive tracts are watered immediately by the river; but, in general, the banks of the Nile above Egypt are irrigated by means of the water-wheel. In early times the case was different, as is shown by the composition of the soil formed of alluvial deposits in places no longer reached by the stream, even in its highest state of flood. The changes of level which have taken place in relation to the river are demonstrated by the hieroglyphic inscriptions at Semneh, a day's journey beyond the second cataract, which attest that 4,000 years ago the average height of the Nile at its utmost flood was 23 feet higher than at the present day, while inversely the yearly inundations of the river in Egypt are continually raising the level of the whole surrounding valley.

The Nile reservoir, for which the great dams at Assouan and Assiout have been constructed, will enable wide tracts of land to bear two crops a year instead of one, will bring waste districts into tillage, and will greatly increase the area of sugar cultivation. The reservoir will supply 1,000,000,000 cubic metres of water annually. See article and illustration under ASSOUAN, Vol. II.; also EGYPT; IRRIGATION.

Niles, Hezekiah, American publisher: b. East Bradford, Chester, Pa., 10 Oct. 1777; d. Wilmington, Del., 2 April 1839. From 1800–5 he was engaged in the publishing business in Wilmington, Del., then moved to Baltimore, Md., where with George Bourne he edited and published the *Evening Post.* In 1811 he founded 'Niles' Register,' a weekly journal, which in 1837 he moved to Washington and published under the name of 'Niles' National Register.' While in Washington he obtained a position in the Pension Office, and gave up the editorship of the 'Register,' which was moved back to Baltimore in 1838 and continued by his son and others till 1849. He published: 'Quill Driving,' a series of humorous essays; and 'Principles and Acts of the Revolution' (1822). The 'Niles' Register' was devoted chiefly to the discussion of politics, and is regarded as one of the most valuable sources for the study of the American history of the period; the volumes for 1812–27 have been reprinted.

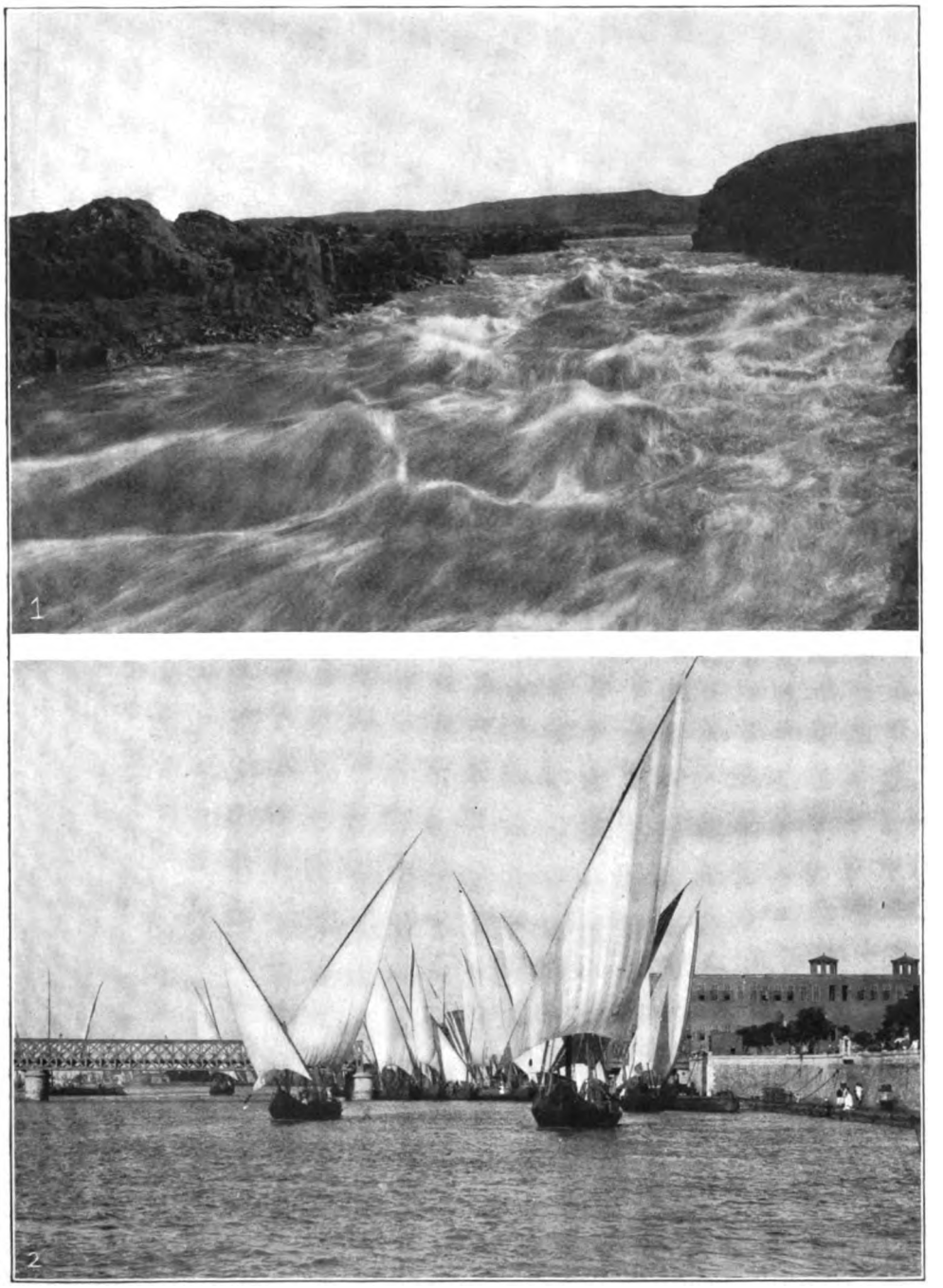
Niles, John Milton, American journalist and politician: b. Windsor, Conn., 20 Aug. 1787; d. Hartford, Conn., 31 May 1856. At 20 he began the study of law, and in 1817 settled in Hartford, Conn., where with the co-operation of others he established the Hartford *Times,* of which he was principal editor for several years, and to which he contributed for 30 years; through this paper he warmly supported Andrew Jackson and the Democratic party. Appointed postmaster of Hartford in 1829 he resigned on receiving the executive appointment to the United States Senate, a post which he retained till 1839. In 1839 and 1840 he was Democratic candidate for governor of Connecticut, and in the latter year was postmaster-general under President Van Buren. He was again elected to the Senate in 1842, and on the expiration of his term in 1849 retired from public life. He published 'The Independent Whig' (1816); 'Gazetteer of Connecticut and Rhode Island' (1819); 'Life of Commodore Oliver H. Perry' (1820); 'History of South America and Mexico, and a view of Texas' (1839); 'The Civil Officer' (1840); etc.

Niles, Nathaniel, American statesman: b. South Kingston, R. I., 3 April 1741; d. West Fairlee, Vt., 31 Oct. 1828. He was graduated from Princeton College in 1766 and subsequently studied medicine, law, and theology, and he preached in various Congregational churches in New England. He settled in Vermont after the American Revolution and there conducted religious services in his own house for nearly 40 years. He served in the Vermont legislature and was its Speaker in 1784, was a judge of the State supreme court and was a member of Congress in 1791–5. As "censor" he assisted in the revision of the State constitution and he was six times presidential elector. He wrote the popular war song 'The American Hero' after the battle of Bunker Hill and published: 'Four Discourses on Secret Prayer' (1773); 'The Fountain of Good' (1777); etc.

Niles, Nathaniel, American lawyer: b. South Kingston, R. I., 15 Sept. 1835. He was educated at Phillips Andover Academy and was admitted to the bar in 1857. He has served for several terms in the New Jersey legislature of which he was Speaker in 1872 and where he has introduced important measures, notably those establishing 1,200 free school libraries and a free school fund of $3,000,000.

Niles, William Woodruff, American Protestant Episcopal bishop: b. Hatley, P. Q., 24 May 1832. He was graduated from Trinity College, Hartford, Conn., in 1857 and from the Berkeley Divinity School at Middletown, Conn., three years later. Entering the Episcopal ministry in 1861 he was rector at Wicasset, Maine, 1861–4, and at Warehouse Point, Conn., 1868–70. He was for six years professor of Latin at

NILE.



1. Rapids of the first cataract.
2. Nile boats near Cairo.

Main

Trinity College, and in 1870 was consecrated bishop of New Hampshire.

Niles, Mich., city in Berrien County; on Saint Joseph River, and on the Michigan C., and the Cleveland, C., C. & St. L. R.R.'s; about 110 miles southwest of Lansing and 90 miles east of Chicago, Ill. Niles is in the region traversed by the earlier explorers who followed the rivers which were inlets and outlets of the Great Lakes. The French missionaries founded here a mission in 1697. On the site of the city, or nearby, was Fort Saint Joseph, the ruins of which are still in existence. In 1782 Spain claimed the land for miles around Niles on account of the capture, in 1781, of this fort by a force of Spanish soldiers. In 1828 a colony of eastern home-seekers located at Niles; in 1838 the village was incorporated, and was chartered as a city in 1859.

Niles is the commercial centre of a productive agricultural region, and its good water-power has made it a manufacturing city. The chief manufactures are windmills, flour, lumber, paper, lithographs, furniture, steel tanks, and dairy products. There is considerable trade in farm products, fruit, and the manufactured articles. The government is vested in a mayor, who holds office one year, and a council. The city owns and operates the electric-light plant and the waterworks. Pop. (1890) 4,197; (1900) 4,287.

Niles, Ohio, city in Trumbull County; on the Mahoning River, and on the Baltimore & O., the Erie, and the Pennsylvania R.R.'s; about 50 miles southeast of Cleveland. It is a manufacturing centre; the chief manufactures are mine and mill supplies, galvanized iron, foundry and blast furnace products, automatic presses, boilers, electric and steam cars, chinaware, incandescent lamps, metal lath, iron roofing, sheet iron, and tin. The government is administered under a charter of 1895, and provides for a mayor, who holds office two years, and a council. The electric-light plant and the waterworks are owned and operated by the municipality.

Nil'gai, a large bluish-gray antelope (*Boselaphus tragocamelus*) of the plains and less forested parts of India, where it forms one of the principal game animals of the country. The short conical horns and general appearance of the head and body are somewhat ox-like; but the legs are long and slender, and a large tuft of hair depends from the chest. Nilgai both graze and browse, feed during the day, and are able to thrive with very little water. Where they are not much hunted they become so tame as to be troublesome to visitors; but when much disturbed grow shy and wary. Their chase is therefore often interesting, but the small horns make so poor a trophy that they are not often shot. The best sport is obtained by running them down on horseback and killing them by spearing. Consult works on East Indian zoology and sport, especially Kinloch, 'Large Game Shooting' (1895), and Baker, 'Wild Beasts' (1890).

Nilgiri, nĭl-gē'rē, or **Neilgherry, Hills,** India, a southern range of Madras, giving its name to a district, and owing to its great elevation, delightfully cool climate, much resorted to by invalided Europeans resident in India, the principal health-station being Ootacamund. The hills rise abruptly from the plains 40 miles from the west coast, to an average height of 6,000 feet, individual peaks shooting up to 8,760 feet. The mass is isolated, with the exception that a precipitous granite ridge leaves its western face and connects witn the Western Ghâts. The surface consists of grassy uplands with large groves of forest trees; but the lower slopes are heavily timbered. Coffee, tea, and cinchona are cultivated. The Nilgiris are inhabited by five distinct tribes, of whom the Todas are the most interesting. They speak a Dravidian dialect and practise polyandry. The men are tall and athletic, with Roman noses, black bushy beards and eyebrows, but they are dirty in their habits. Their sole occupation is tending cattle. The Nilgiris district has an area of 597 square miles; pop. (1901) 111,449.

Nilom'eter, in hydraulics, an instrument for measuring the rise of the Nile during its periodical floods. On the island of Er-Ródah is a graduated pillar, upon which the height of the water is read off. The pillar stands in a well which communicates with the river. In the time of Pliny, a height of 12 cubits meant famine, 13 scarcity, 15 safety, and 16 plenty. At present the canals are cut and distribution commences when the river reaches 18 cubits; 19 cubits is tolerable, 20 adequate, 21 excellent, 22 abundant, and 24 ruinous. See NILE, THE.

Nilsson, nĭl'sŏn, **Christine,** Swedish operatic soprano: b. Hassaby, near Wexiö, Sweden, 3 Aug. 1843. She was educated for the operatic stage by Berwald at Stockholm, and Massé and Wartel at Paris. In 1864 she made her first appearance as Violetta in 'La Traviata' at the Theatre Lyrique, Paris; and she appeared in 1867 in that role for the first time in England at London. She sang in the United States in concert in 1870, in opera in 1871; and appeared there again in 1873–4 and 1882. She was last heard in New York on 16 April 1883. Among her most famous impersonations are Ophelia in Thomas' 'Hamlet,' and Margaret in Gounod's 'Faust'; Elvira in 'Don Giovanni' and Elsa in 'Lohengrin.' In 1872 she married M. Auguste Rouzaud, who died in 1882; and in 1886 she married Count A. de Miranda. Since 1888 she has lived in retirement. Her voice was a soprano of moderate power, but very brilliant and even.

Nimapu, nĭm'a-poo. See SAHAPTIAN INDIANS.

Nim'bus, (1) in painting, the halo or collection of rays with which artists surround the heads of sacred persons, in Christian art, of Christ, and the angels and saints. The use of this ornament is both ancient and widespread, being exemplified in the Indian, Egyptian, Etruscan, Greek, and Roman religions. The ancient poets speak of their deities as being crowned with such a nimbus in their occasional appearances on earth, and in paintings this nimbus was represented in the same way as in the paintings of Roman Catholic artists. The nimbus of Christian art is usually circular in form, but sometimes it is triangular; sometimes in the form of three rays, one proceeding from the summit of the head, and the other two from the sides, so that the three form three arms of a cross. The triangular nimbus symbolizes the Trinity; it is sometimes enclosed in a circle, which symbolizes eternity. The nimbus with three rays

is also a symbol of the Trinity. Another form of the nimbus is that in which one of the common circular shape supports a cross. (2) In meteorology, the word is applied to a rain cloud; sometimes classed as if forming a primary or fundamental variety of cloud; it is really a mixture of the stratus, the cumulus, and the cirrus. It has a uniform gray tint and fringed edges.

Nimeguen, nĭm'ā-gĕn. See NIMWEGEN.

Nîmes, nēm, or **Nismes,** France, a southeastern city, capital of the department of Gard, 62 miles northwest of Marseilles, noted for its ancient buildings and monuments of Roman origin, which are second only to those of Rome. It is situated in a delightful plain, and handsome boulevards occupy the site of the former ramparts. The city proper is small and irregularly laid out, with narrow streets and ill-built houses; but its three suburbs, one of which, called the Cours-Neuf, is larger than the city itself, present a finer aspect, having wide, straight avenues, fine public walks, and handsome buildings. Among the edifices of the Christian era are the cathedral, begun in the 11th century, but constructed chiefly in the 16th and 17th, occupying the site of a temple of Apollo; the church of St. Paul; the new palace of justice; the general hospital; the Hôtel Dieu, rebuilt in 1830; the public library; the central house of detention, which is the citadel built by Vauban over the remains of the old Fort Rohan erected in 1629 by the Calvinists; and the fine monumental fountain by Pradier, erected in 1851, on the esplanade. The public garden, where is still to be seen the fountain that furnished the Roman baths with water, and the beautiful promenade known as the Cours Feuchères, are also attractive features. Nimes is the seat of a Roman Catholic bishop, of a Protestant consistory, and has tribunals of primary jurisdiction and commerce, a departmental academy, several learned institutions, a lyceum or college, a normal school, a theological seminary, schools of drawing, chemistry and physics, geometry and mechanics as applied to the arts, a society of medicine, a Bible society, and a museum of natural history.

The monuments of the Roman period are the Maison Carrée, so called from its rectangular form, a beautiful Corinthian temple nearly in the centre of the city. It stands on a stylobate, and is approached by 15 steps; the platform is 82½ feet long and 40¼ feet wide, and the building and platform together are 58½ feet high. It is surrounded by 30 columns, 10 of which are detached and form the portico. It suffered greatly during the Middle Ages, but since 1789 it has been taken care of, restored, and surrounded by an iron railing. In 1823 it was converted into a museum of paintings and antiquities. The amphitheatre, or Les Arènes, is the most perfect of its kind extant. Its height outside is from 68 to 104 feet, and its external circumference 1,174½ feet. It has from 32 to 35 ranges of seats, and was capable of accommodating from 17,000 to 23,000 spectators. It was used as a fortress by the Visigoths and the Saracens, when attacked by the Franks; during the following centuries it was also occupied as a stronghold. No fewer than 2,000 persons had established their abode within the walls of this building, when in 1809 it was cleared by order of the prefect; and it has since been protected against encroachments. The Tour Magne (*turris magna*) is the remnant of a tower which flanked the ancient walls. The boulevards now occupy the site of the ramparts, but portions of them are still extant in the Porte d'Auguste and Porte de France, two Roman gates, the former of which is ornamented with sculptures. To these monuments must be added a ruined *nymphæum,* a fane dedicated to the nymphs, which communicated with a neighboring bath for women, the remains of which have been mistaken for those of a temple of Diana. The magnificent aqueduct, known as the Pont du Gard, is in the vicinity of Nimes. (See GARD, PONT DU.)

In point of industry and commerce Nimes holds a distinguished rank; it is the great southern mart for raw and manufactured silk. Its manufactures are principally silk shawls and hosiery; mixed silk, cotton, and woolen stuffs; blonde lace and tulles, galloons, ribbons, and carpets. There are several large dyeing and printing establishments, vinegar factories, and distilleries. Its trade is mostly in wine, brandies, vinegar, essences, and oil.

Nimes is supposed to have been built by a Greek colony, and was afterward for about 500 years in the possession of the Romans. In the 16th century it became a stronghold of Calvinism, and suffered much during the civil wars. The treaty known as the Pacification of Nimes, concluded here in 1629, granted freedom of worship to the Huguenots, but deprived them of their fortified towns. In 1815 it was the scene of religious violence, in consequence of the reaction of that period. Guizot and Daudet were natives of this town. Pop. (1901) 80,355.

Nimra'vus, a genus of large Tertiary fossil cats, typical of the family *Nimravidæ,* or *Machærodontidæ,* which includes the various sabre-toothed tigers (q.v.).

Nim'rod, according to the Mosaic scriptures, the founder of the Babylonian monarchy, son of Cush. He flourished about 2450 B.C. He is styled a mighty hunter "before the Lord," a somewhat vague expression, but evidently referring to battle and conquest as well as to the chase. All that is definitely known about Nimrod is that he was a Cushite, that he established a kingdom in Shinar, the classic Babylonia, the chief towns being Babel, Erech, Accad, and Calneh, that he extended his kingdom northward along the Tigris over Assyria, where he founded a second group of capitals, Nineveh, Rehoboth, Calah, and Resen. In the Chaldæan epic of the deluge Nimrod has by some scholars been identified with Gilgamesh, the heroic figure whose story is dated about 2200 B.C. Consult: 'Variorum Aids to the Bible Student' (1898).

Nimrud, nĭm'rood, Asiatic Turkey, the name given to a mound which is supposed to be the site of an ancient Assyrian city; on the east bank of the Tigris River at the confluence of the Tigris and the Zab Ala; and 18 miles below Mosul. It is supposed to be the city Calah, mentioned in Genesis x. 11, a suburb of Nineveh. See NINEVEH.

Nimwegen, nim'wā-gĕn, or **Nimeguen,** nĭm'ā-gĕn (ancient NOVIOMAGUS; Dutch, *Nijmegen*), Netherlands, city in the province of Gelderland; on the Waal, about 12 miles south of

Arnheim. Built in the form of an amphitheatre, on a series of hills, it overlooks a beautiful valley. It is in a productive agricultural region in which grain and grapes are prominent productions and much attention is given to stock-raising. The chief manufactures are leather, tin, wine, eau de cologne, flour, and cigars. It has an extensive trade in wine, grain, and cattle.

Nimwegen possesses many ruins showing its Roman origin. It was originally a Roman camp by means of which control was exercised over the Teutons living northeast of the Rhine. It was one of the Hanse towns. From 1585 for nearly 100 years it was the scene of much of the contentions, and also of the peace-makings among the Spaniards, Swedes, French, and Dutch. The «Peace of Nimwegen» in 1678–9, was the ending of the contest between the French and the Dutch, the great event in the life of Louis XIV. It marked the time when France became one of the Great Powers. Pop. (1900) 42,756.

Ninde, William Xavier, American Methodist bishop: b. Cortland, N. Y., 21 June 1832; d. Detroit, Mich., 3 Jan. 1901. He was graduated from Wesleyan University, Middletown, Conn., in 1855, and was for a time engaged in teaching, receiving ordination in 1856. He was in charge of various churches in Ohio and in 1870 was transferred to the Detroit conference. He accepted the chair of practical theology at Garrett Biblical Institute, Evanston, Ill., in 1873; in 1879–84 he was president of the Institute. In 1884 he was elected bishop. He was the first president of the Epworth League.

Nindemann, Wilhelm Friedrich Carl, German-American Arctic explorer: b. Gingst, Germany, 22 April 1850. He removed to the United States in 1867 and in 1881 accompanied the Polaris expedition. When the Polaris was caught in the ice he with 18 of the crew drifted on an ice-floe for seven months. They were rescued by the Tigress in 1873 and he subsequently joined the crew of the Jeannette and when the vessel was lost was despatched for aid in 1881 by Captain De Long. He assisted in the search for De Long and his companions, whose bodies were discovered the next year. He published 'Eines deutschen Matrosen Nordpolfahrten' (1885).

Nine-bark, an American shrub (*Opulasta opulifolius*), of the rose family, common throughout the eastern part of the United States. It has an ungainly form, glabrous twigs, bright green, three-lobed, crenate-lentate leaves, and small white or purplish flowers in terminal corymbs. Its bloom, remarks Mrs. Lounsberry, is not very pretty, but it redeems itself by the beauty of the ripening pods. «They, hanging in quantities at the ends of its long, curving branches, produce something the same effect as the fruit of a species of opulus or cranberry-tree. . . . The common name which would naturally recall one of the hydrangeas, is in refernce to a trick of the bark in peeling not nine but many times into dilapidated-looking strips.» The hydrangea (q.v.) referred to is *H. radiata,* a showy wild shrub, which is given this name by the mountaineers of the Southern States on account of the ragged peeling of its bark. Both shrubs flourish in rocky and swampy places, and both are susceptible of cultivation. Consult Lounsberry, 'Southern Wildflowers and Trees' (1901).

Nine-Pins, a game with nine pins or bottle-shaped pieces of wood set on end, at which a large wooden ball is rolled for throwing them down. See BOWLS; BOWLING.

Nine Worthies, romantic heroes grouped together in Arthurian legend, especially in the 'Triomphes des neuf Preux,' where the author describes a vision in which he saw three Jews (Joshua, David, Judas Maccabæus), three pagans (Hector, Alexander the Great, Julius Cæsar), and three Christians (Arthur, Charlemagne, Godfrey of Bouillon). These worthies, with occasionally a tenth, Bertrand du Guesclin, and with Guy of Warwick sometimes substituted for Godfrey of Bouillon, may be traced back to old Welsh legends; Brunet says the three triads are of Spanish origin; and Dunlop showed that the list appeared in an old Low German poem on Alexander. Shakespeare makes them the butt of some fooling in 'Love's Labour's Lost.'

Ninekiller. See BUTCHER-BIRD.

Ninety-six, Fort, a former Revolutionary fort in Abbeville County, S. C., near the Saluda River. It was so-called on account of being 96 miles from the frontier fort of Prince George.

Ninety-three ('Quatre-Vingt-Treize'), a novel by Victor Hugo, published in 1874. It bears the sub-title: 'Premier Recit. La Guerre Civile,' and was intended to form the first part of a trilogy. The edition of 1882 contains several remarkable designs signed by the author. The story deals with an episode of the Vendean and Breton insurrection.

Nineveh, nĭn'ē-vē, the ancient capital of the Assyrian empire. The site of the city, which was destroyed about 606 B.C. by the Babylonian Nabopolassar and the Mede Cyaxares, has been identified with the modern Kouyunjik. It stands on the left bank of the Tigris, opposite to the town of Mosul. The first historic notice of Nineveh is in Genesis x.; it is described as «a great city» in the time of the prophet Jonah (about 865 B.C.). Ezekiel at the beginning of the 5th century B.C. speaks of its desolation in the most vivid imagery. «The Assyrian was a cedar in Lebanon, with fair branches»; «All the trees of Eden that were in the garden of God envied him»; but «strangers, the terrible of the nations, have cut him off»; «upon the mountains and in all the valleys his branches are fallen and his boughs are broken by all the rivers of the land; and all the people of the earth are gone down from his shadow and have left him.» It was known to travelers that vast mounds covered the banks of the Tigris opposite Mosul and extended to a considerable distance inland. They were long considered to cover the ancient site of the Assyrian capital, but it was not until 1841 that M. Botta, the French consul at Mosul, began excavations with the result that he obtained a few fragments of brick and alabaster. He renewed his efforts at Khorsabad, 12 miles to the northeast, in 1843 and discovered an Assyrian edifice which had remained buried in the sand for thousands of years. The work was continued by Layard, who explored the lofty mounds of Nimrûd, situated 18 miles south-southeast of Mosul at the point where the tributary Zab joins the Tigris. This was the beginning of a series of the most remarkable discoveries. He immediately came upon numerous slabs covered with cuneiform inscriptions of

unique importance. A chamber in the ancient ruins was lined with these; they were in excellent preservation. He unearthed, moreover, gigantic figures of various kinds — winged bulls and lions with human heads and winged sphinxes, which stood as guardians at the gates of stately palaces. It was evident that the old city had been destroyed by fire, for the stone images in many cases were calcined and crumbled into dust on exposure to the air. The fire had not, however, desolated what the explorer designated the northwest palace. Here he discovered in excellent preservation 28 rooms, decorated with bas-reliefs, carvings, and moldings which told the tale of the art and civilization which had flourished at Nineveh in its palmy days. Returning to Kouyunjik Layard met with even more important results from his excavations. When he pierced the mounds at this point he was enabled to explore nine vast rooms, one of them 130 feet long, and all replete with interesting and valuable sculptures, inscriptions, and carvings. In 1849, after returning to England and arousing the interest of the learned world in his magnificent discoveries, he renewed his work at Kouyunjik and found an almost inexhaustible treasury of antiquities in the sand mounds of the pl in. He was now acting as agent for the British Museum, whose Assyrian collection he enriched with some of its most precious examples of art and inscriptions. Loftus and Hormuzd Rassam continued the work in 1853 and the excavations at Nimrûd were renewed by George Smith in 1873. There can be no doubt that some of these monuments represent the remains of ancient Nineveh, and scholars have arrived at the conclusion that the city of Ninus occupied the site of Kouyunjik and Nebbi Yunus on the left bank of the Tigris at the confluence of the Zab. Asur, an even earlier capital of Assyria, was undoubtedly built on the site of the modern Kalah Sherghat. The palaces of Sennacherib and Assurbanipal have been unearthed from the mounds of Kouyunjik, and a second palace of Sennacherib and Esarhaddon from the mounds of Nebbi Yunus. It is concluded from these discoveries that Nineveh proper was one of a cluster of cities and royal residences that stood on the banks of the Tigris. This city was square in shape, and each of the four walls was a mile in length. The palace of Sargon at the northern angle had a façade 400 yards in width. The chief sculptures and inscriptions which are now stored in the British Museum belong to palaces and temples in the northwest of the city. The principal palace was built in the 9th century B.C. by Assurnasirpal. Near by he built a great tower, rising with narrowing stages. His son Shalmaneser II. built the central palace of the group. The statue of Nebo in the British Museum was brought from what has been called the southeast palace, but was really a temple.

Nineveh was not the earliest capital of Assyria and only came into importance in the time of Sennacherib, who is recorded on the inscribed bricks to have built its walls. From his time it was the chief seat of empire, and gave its name to the whole group of cities between the Tigris and the Zab. Hence Jonah describes this Nineveh as a city of three days' journey, and Diodorus declares its circuit was 480 stadia.

Consult the works of Layard, Botta, and Flandin; also Oppert, 'Expédition en Mesopotamie'; Smith, 'Assyrian Discoveries.'

Nineveh, Pa., Cavalry Engagement at. After the battle of Cedar Creek (q.v.) in Virginia, Gen. Sheridan on 9 Nov. 1864 withdrew his army to Kernstown, and Gen. Early followed him as far as Middletown. Sheridan ordered Torbert, commanding his cavalry, to move on Early at noon of the 12th, Merritt's and Custer's divisions to the right, on the Back and Middle roads, against Rosser, and Powell's division to the left, on the Front Royal road, against Lomax. Powell moved down the road as directed, and thence across toward Middletown, and at Nineveh met McCausland's cavalry brigade, which charged him; but he made a counter-charge and routed it, capturing two guns, three wagons, two battle-flags, and 161 prisoners, and pursuing eight or nine miles up the Luray Valley. Six regiments were engaged on either side. The Union loss was 2 killed and 15 wounded; the Confederates lost 20 killed and 35 wounded. Meanwhile the column on the right drove Rosser across Cedar Creek, and under cover of the night Early again retreated up the valley to New Market. Consult: 'Official Records,' Vol. XLIII.; Pond, 'The Shenandoah Valley in 1864.'

E. A. CARMAN.

Ningpo, nĭng'pō', China, a city and treaty-port in the province of Che-Kiang, in a fertile plain on the left bank of the Takia or Ningpo River, 16 miles from its mouth, and about 100 miles south of Shanghai. It was opened to foreign trade by the Treaty of Nankin in 1842. It is surrounded by walls 5 miles in circuit, 25 feet high, and 15 feet wide at top, and, besides, has extensive suburbs outside. Though highly extolled by the Chinese as one of the most beautiful cities of the Celestial Empire, it consists of narrow filthy streets and one-storied houses, sometimes of stone, but mostly of brick. Its most remarkable edifice is a brick tower, formed of seven stories, and above 160 feet high, but now a mere ruin, and it contains numerous temples, colleges, etc., chief among them the temple of the Queen of Heaven, founded in the 12th century, but the present building, elaborately and richly ornamented, dates from 1680. Shops and immense storehouses occupy the quarters near the river, while eating-houses and tea shops abound near the gates and in the suburbs. A medical hospital, opened by a missionary society in 1843, has been found very beneficial. The manufactures consist chiefly of silk and cotton goods, carpets, furniture, etc. The native trade is very extensive. The principal exports are tea, silk, and raw cotton; and the principal imports, besides manufactured goods, sugar and opium. The average value of the trade of Ningpo for 10 years past has been about $11,400,000. The great bulk of the trade is carried on with the other treaty ports. Ningpo was taken by the British without resistance in 1841. Pop. estimated at 260,000.

Ninian, nĭn-ĭ-an, **Saint,** the apostle of the southern Picts. He labored in evangelizing northern England and southern Scotland at the end of the 4th and the beginning of the 5th centuries. He was a Briton by birth, but had been thoroughly educated in language and philosophy at Rome. The field of his activity extended as far north as

the Grampian Hills, and his see was Candida Casa, Whithorn, the modern Wigtonshire, the southwestern county of Scotland. His death is placed by hagiologists in 432 and his festival is 16 September. The only church building which he is recorded to have founded is dedicated to St. Martin of Tours.

Nin'igret, an American Indian sachem of the Niantics, one of the Algonquin tribes. In 1637 he assisted the colonists in the Pequot war. In 1667 he sold much of his land on Long Island to the colonists. He died in 1677.

Niño, Pedro Alonso, pā'drō ä-lōn'sō nē'ñō, Spanish navigator: b. Moguer, Spain, about 1455; d. about 1505. He accompanied Columbus on his third voyage in 1498 to Trinidad and the coast of Paria, and returned to Spain filled with the project of making an expedition to the new country in search of treasure. He was granted the royal permission, one fifth of the spoils to be the share of the Crown. The voyage was a successful one; he peaceably obtained from the Indians a great store of treasure, but was accused of withholding the share belonging to the king and died before the suit was ended.

Ninon de l'Enclos, nē-nôṅ dė lŏṅ-klō, or **Lenclos.** See LENCLOS, ANNE.

Ninus, nī'nŭs, eponymous king of Nineveh and founder of that city. His name is nowhere mentioned, apparently, in Assyrian monuments, and the story that he extended the Assyrian empire to India and to Egypt is historically false. But he figures largely in Greek myth and "history," where Nineveh is said to have been founded by him and named for him; he married Semiramis, wife of Onnes, but his wife murdered him, and ruled as regent for her son Ninyas, who is as mythical a personage as his father. For Semiramis alone in these stories does history show any actual existence.

Niobe, nī'ō-bē, in Greek mythology, the daughter of Tantalus, was the wife of Amphion, who, in common with Zethus, governed Thebes, which they had built. According to the common accounts she had seven sons and seven daughters, and, proud of her blooming offspring, she so far forgot herself as to exalt herself above Latona, the mother of only two children — Apollo and Artemis; and in punishment of her presumption she had to witness the destruction of her children by the arrows of the twin deities. Anguish and despair transformed the wretched mother, after long wanderings, into a stone. Amphion and Zethus also fell, pierced by the arrows of Apollo, when, full of wrath, they penetrated into the sanctuary of the god. This is the most common account of the fate of Niobe, in the circumstances of which poets frequently differ, who have taken this story for a subject as often as artists. The origin of the fable seems to lie in the ancient figure of speech by which it was said of young people who died suddenly that they had been struck with the arrows of Apollo or Artemis; and in almost all languages, petrifaction is the natural image of the highest degree of torpid despair.

Niobe of Nations, The, a name applied to Rome, the "lone mother of dead empires."

Nio'bium, in chemistry, a metallic element discovered in 1801 by Hatchett, but more fully investigated by Rose, who named it. Niobium is present in columbite, euxenite, pyrochlore, and in other minerals. The metal may be prepared from the fluoride of niobium by heating it in a covered crucible with sodium, and dissolving out the soluble salts with water. It is insoluble in nitric acid, difficultly soluble in hydrochloric acid, but dissolves in hot hydrofluoric acid. It forms two oxides of a chlorous character, uniting with basylous oxides to form salts.

Niobrara, nī-ō-brä'ra, a river which has its rise in Laramie County, Wyo., and which flows east into Nebraska, crosses the northern part of the State, making regular, long north and south curves, and flows into the Missouri River at Niobrara in Knox County. It is about 460 miles long, flows rapidly in the upper part of its course, but moves slowly through the almost level prairie country of the northern part of Nebraska.

Niobrara Stage, in geology, a subdivision of the upper Cretaceous division, forming with the Benton stage the Colorado Epoch. It occurs in Kansas and South Dakota as well as in Colorado and further West, has a maximum thickness of 2,000 feet, and includes chalk, calcareous marls, shales, sandstones, and limestones.

Ni'pa, an East Indian palm (*Nipa fruticans*) of the order *Palmæ* and the only species of its genus. It is a low-growing tree with creeping, smooth stems, and large clusters of fruit. Its abundant sap is used for sugar- and wine-making and its feathery leaves for thatching or roofing. These leaves are often 20 feet long and form the principal material for house-building in the farms and villages of the Philippines and East Indies generally. It abounds in the salt marshes, and like the mangrove (q.v.) with which it is commonly associated, it is an important land-builder.

Nipal, nē-pâl'. See NEPAL.

Niph'er, Francis Eugene, American physicist and electrical engineer: b. Port Byron, N. Y., 10 Dec. 1847. He was graduated from the Iowa State University in 1870, and became instructor there. He afterward went to Washington University as professor of physics and electrical engineering. In 1877 he organized the weather service of Missouri and in 1878 the Magnetic Survey. In 1889 he showed that positive photographic pictures could be developed in the full glare of sunlight instead of in a dark-room; and he also made the discovery that a photographic plate over-exposed could be developed as a positive and that a zero point exists between the negative and the positive which cannot be developed at all. He wrote: 'Theory of Magnetic Measurements' (1886); 'Electricity and Magnetism' (1895); 'Introduction to Geographical Algebra' (1898). He has also contributed scientific articles to the 'Transactions' of the St. Louis Academy of Science, of which he is a member.

Niphon, Nippon, Nipon, or **Nihon,** the various Japanese pronunciations of Jih-pen (whence Japan), signifying sun-origin, the Chinese name for the island empire, and locally adopted by Japan in the 7th century. Niphon was long used by foreigners to designate the principal island Hondo. See JAPAN.

Nip'igon, a lake in Canada. See NEPIGON.

Nipissing, nĭp'ĭ-sĭng, or **Nepissing, Lake,** in Ontario, Canada, lies at an altitude of 600 feet above sea-level, northeast of Georgian Bay, Lake Huron, with which it communicates by French River. It is irregular in coast-line, is 48 miles long, and has a maximum breadth of about 30 miles. Its chief feeder is Sturgeon River, draining from the north a group of smaller lakes. The lake contains numerous islands, one of which is an Indian reservation. The Canadian Pacific railroad skirts the northern shore, and has stations at North Bay, and Nipissing Junction, on the lake shore. Steamers ply on the lake and the region has become a favorite sporting and hunting ground.

Nipissing Indians, an American tribe of the Algonquin family residing on the shores of Lake Nipissing, in northern Ontario, Canada. In the 17th century they were one of the most important tribes of British America and were regarded by the Jesuit missionaries as the typical Algonquins. A few survivors remain in the vicinity of Montreal.

Nip'muc Indians, or "fresh water people," an American tribe residing in colonial days in Massachusetts. The majority of the Nipmucs did not at first join with Philip in his war against the colonists, but were active against the English during the struggle in Connecticut in 1675. In January 1676 the remnant of Philip's tribe, with the Narragansetts, the Quaboag, and River Indians, effected a junction with the Nipmucs. On the overthrow of Philip the Nipmucs fled to Canada.

Nip'per, Susan, in Dickens' 'Dombey and Son,' a young maid, nurse to Florence Dombey. She marries Toots. The sharpness of tongue whereby she justifies her name is offset by fidelity to her charge.

Nipperdey, nĭp'pĕr-dī, **Karl Ludwig,** German philologist: b. Schwerin, Germany, 13 Sept. 1821; d. Jena, Germany, 2 Jan. 1875. He was educated at the universities of Berlin and Leipsic and in 1852 accepted a professorship at Jena. He made translations of Cæsar, Nepos, Tacitus, etc., with critical notes, which have been widely used. See Schöll's biography (1875), and his collection of his works, 'C. Nipperdeii Opuscula' (1877).

Nippur, nĭp-poor', Asiatic Turkey, an ancient city of Babylonia, between the Tigris and Euphrates, 120 miles southeast of Bagdad, its site now marked by the numerous mounds and excavated ruins at Nuffar. Nippur was a great and flourishing city 4000 B.C., and the tablets of its great library discovered since 1888 antedate Abraham's departure from Ur of the Chaldees for the Promised Land. Nippur is identified with the Calneh of Genesis x. 10, and was the most northerly and easterly of the four conspicuous centres of Babylonian civilization and religion, literature and science. It was the seat of the worship of Bêl, or the sun, the angry En-Lil, or Lord of the Storm, the cause of all the weather troubles of mankind, and the original conception of a god of anger and a religion of fear.

Nippur was overthrown and its buildings ruined by the Elamite hordes under Kudur-Nankhundi, 2285 B.C., who destroyed nearly every city of Babylonia. Favored by the permission and protection of the Sultan and his administration, the University of Pennsylvania has since 1888 excavated and laid bare many of its important ruins. The work was supervised first by Dr. John Punnett Peters, and latterly by Dr. J. H. Haynes and Professor H. V. Hilprecht. Considerable attention was paid to the excavation of the great temple of Bêl, the foundation of which was laid between 6000 and 7000 years before Christ. An ancient government palace of immense proportions, where the kings lived, belonging to the fifth millennium before Christ, and one of the ancient gates and walls of the city, were uncovered. A government palace erected about 3000 B.C. was completely and systematically excavated, besides numerous other buildings of less importance. Most valuable inscriptions in stone belonging to the earliest rulers of Babylonia, by the help of which the early history of mankind in the valley between the Tigris and Euphrates will be reconstructed, were discovered. Antiquities in coins, jewelry in gold, silver, and bronze in great quantities; vases in enameled and plain pottery of all periods; seals and seal cylinders, such as the Babylonians used in connection with their business transactions; images of gods, playthings in terra-cotta, basreliefs, weights, utensils in bronze, iron, and silver, etc., were also found. These were a few of the important relics recovered, without mentioning the numerous facts ascertained and the many questions solved through study in the trenches, which have important bearing upon the religious ideas and customs of the daily life of the Babylonians. But chief of the important discoveries made during 1889–1900 were those in connection with the famous library of the sanctuary, which was found beneath 25 feet of accumulated débris, representing several millenniums of history. In the uppermost stratum of this mound the excavators found coffins which had been buried in the early centuries of our Christian era. A great many antiquities were also gathered which belonged to the Jews who continued to live at Nippur after the return of Ezra and Nehemiah. Prominent among them were terra-cotta bowls containing incantations and charms inscribed in Hebrew and Mandæan. At a depth of 25 feet were found a series of rooms, a number of which contained ledges or shelves built out from the wall, for the purpose of laying out the tablets in rows. The library seems to have been divided into two parts. There was a business section for keeping accounts, and the educational quarters, with a vast library of a literary character.

Nearly 20,000 tablets were recovered, illustrating practically every branch of literature known to the Babylonians. Among the inscriptions are hundreds of historical texts, dictionaries, or lists of Sumerian words with Semitic equivalents; lists of birds, animals, plants, and stones; lists of words for chairs, stools and other articles of furniture; hymns, astronomical and mythological inscriptions, tablets which refer to the service and functionaries of the temple — how many garments the god Bêl wore, how many temples and shrines there were at Nippur besides those dedicated to Bêl, and what the revenues of the temples were; tablets containing grammatical sentences written by students, arithmetical calculations, etc.

In appreciation of Professor Hilprecht's valuable services, the Sultan presented him with,

among other important antiquities, the larger part of the find of the library, which is now deposited in the University of Pennsylvania, and is undergoing systematical decipherment.

Only a small portion of the mounds at Nippur has thus far been completely excavated. Considerable work yet remains to be done on the temple. Only one side of the ancient government palace has been cleared, and about one twentieth part of the library, but arrangements have been effected for a continuance of the work of excavation until completed. See ASSYRIA; BABYLONIA, and illustrations Vol. II. Consult: Hilprecht, 'Old Babylonian Inscriptions, Chiefly from Nippur' (1893–6) and 'Explorations in Bible Lands During the Nineteenth Century' (1903); Peters, 'Nippur, or Explorations and Adventures on the Euphrates' (1897).

Nirukta, nĭr-rook'ṭa. See VEDA.

Nirvana, nĭr-vä'ṇa, a term which originally denotes the blowing out or extinction of a flame, and is used in the metaphorical language of Buddhistic philosophy to mean that condition which succeeds to the long process of metempsychosis to which imperfect souls are subjected before they reach the end of Karma, the active life of earthly effort and struggle after perfection. Nirvana, according to Rhys Davids, was originally intended by Buddha to indicate extinction of existence, annihilation, as an escape from the perturbations of passion, and the miseries of life. The utterly negative character of this conception seems later on to have undergone a change. Buddha has said "it is enough to know that Nirvana is an advance beyond life; it is a condition of fearless security and happiness." But there is no definite implication that this happiness is conscious, or that a sense of personal identity accompanies it. Annihilation may be quite consistent with "Freedom from the pang of earthly existence" and even prove "a region or condition of peace." This peace in Nirvana results from the fact that no transmigration into baser forms of wretched ghost, beast, or demon is possible for the enfranchised spirit. The "extinction" in this case will only mean the extinction of the baser elements in the individual. The great and pure elements are developed in inverse ratio: there follows a calm and sinless state of mind, such as even Lucretius sometimes caught sight of when he speaks of "vita dis digna" as the object of the philosopher. "The life worthy of Gods," — holiness, purity, freedom, wisdom, this is nirvana in the true Buddhist sense; though, when and where it is to be realized is left one of the misty problems of oriental mysticism. Consult: Müller, 'Die Bedentung von Nirvana'; Rhys Davids, 'History and Literature of Buddhism'; Obry, 'Du Nirvana Bouddhique'; Johnson, 'Oriental Religions: India.' See BUDDHA; BRAHMANISM; HINDUISM; JAINA.

Nisami, nĭ-sâ-mē'. See NIZAMI.

Nisan, nī'săn, in the Jewish calendar, the first month of the sacred year and seventh of the civil year, answering nearly to our March. See CALENDAR.

Nisard, Jean Marie Napoléon Désiré, zhŏn mä-rē nä-pō-lā-ôn dā-zē-rā nē-zär, French author: b. Châtillon-sur-Seine 20 March 1806; d. San Remo, Italy, 25 March 1888. He became professor of eloquence at the Collège de France, Paris, in 1843; in 1857 director of the Ecole Normale Supérieure, and in 1867 a senator. In 1850 he was elected to the Academy. His reputation as a historian of literature was established by his 'Etudes de Mœurs et de Critique sur les Poètes latins de la Décadence' (1834). Others of his works are: An excellent 'Histoire de la Littérature française' (1844–9); 'Mélanges d'Histoire et de Littérature' (1859); the distinguished study, 'Les quatre grands Historiens latins' (1847); and 'Nouveaux Mélanges' (1886).

Nisbet, nĭz'bĕt, **Hume,** Scottish artist and novelist: b. Stirling, Scotland, 8 Aug. 1849. Leaving Scotland at 16 he spent six years in Australian travel and on his return was for eight years prior to 1885 art master in Watt College, Edinburgh. He has since twice revisited Australia and has published 45 romances, including 'Bail Up'; several volumes of verse, and various works on art, such as 'Where Art Begins,' and also of travel, such as 'A Colonial Tramp.'

Nisbet, John, Scottish forester: b. Edinburgh 2 Oct. 1853. He was educated at Edinburgh University, where he is now examiner in forestry, and also studied at Munich. Entering the Indian forest service in 1875 he became conservator of forests, Burma, in 1895, retiring in 1900. He has published 'British Forest Trees' (1893); 'Studies in Forestry' (1894); 'Our Forests and Woodlands' (1900); 'The Management of Forests in Theory and Practice' (1901); 'Burma under British Rule, and Before' (1901).

Nisbet, Robert Buchan, Scottish painter: b. Edinburgh 1 July 1857. He was educated at the Edinburgh Institution and chose as his profession that of landscape painter in water colors. His success was attested by the awards made to him at three international exhibitions — Dresden (diploma) 1892; Antwerp (medal) 1894; Vienna (medal) 1898. Among his most notable works are: 'Evening Stillness' (purchased by the Chantrey Bequest) 1890; 'Thundery Weather'; 'Harrowing'; 'Waiting for the Tide' (1898); 'Between Showers' (1898).

Nish, nēsh, or **Nissa,** nēs'sa, Servia, a fortified city on the Nishava, a tributary of the Morava, 130 miles southeast of Belgrade. It has Turkish and Servian sections, but as an increasing commercial and railway centre is rapidly becoming modernized. It was the seat of the National Assembly until 1901, and is the see of a Greek bishop. It has hot springs and baths, celebrated since the Roman era, when Nish is mentioned as Naissus by Ptolemy. Constantine the Great was born at Nish. Situated at the junction of many of the main highways of the Balkan Peninsula it has had a turbulent history, in 1456 being captured by the Turks; in 1878 it was taken by the Servians under King Milan. The unsuccessful attack in 1809 is still perpetuated by the "Tyele-Koula" (Tower of Skulls), erected by the Turks half a mile east of Nish, and consisting of the heads of Servians killed during the battle. Pop. (1895) 21,524.

Nishan el-Aaman, nĭ-shän' ĕl ä-män' (Ar. *Nishan al-aman,* order of the best), Tunisian order of honor founded by Mohammed-es-Sadok in 1859. It commemorates the adoption of the constitution and has but one degree.

Nishan el-Iftikhar, ĕl-ĭf-tĭ-kär′, a Tunisian order of merit, the data concerning which is not complete, but of which several medals were distributed by the bey on his visit to France in 1846. The degree seems to be indicated by the pecuniary value of the medal.

Nishan el-Iftikhar, Turkish order founded by Sultan Selim III. and revived in 1827. It is conferred upon foreigners who have rendered services to the Turkish state. There are no classes of honor, but the value of the medal differs with the degree of the recipient.

Nishan i-Imtias, ēm-tē-äs′, Turkish order of merit founded in 1879 by Sultan Abdul Hamid. It is conferred upon Turkish officials who have displayed at least three of the attributes: patriotism, fidelity, bravery, and zeal, these names being engraved on the medal.

Nishan i-Shefkiat, ē-shĕf-kät′ (Ar.-Pers. *Nishān-i-shifqat,* order of clemency), Turkish order of three degrees established by Sultan Abdul Hamid in 1878. The medal is conferred upon women who have rendered aid to their country in times of war or peril.

Nishapur, nĭsh-ä-poor′, Persia, the capital of a province of Khorasan, situated in a fertile plain at an altitude of 3,900 feet, 50 miles west of Meshed. Anciently it was of great commercial and political importance. An active domestic trade is still carried on, and the city has long been celebrated for the quality of the turquoises found in the district. Omar Khayyam was born here in 1123, and his unpretentious tomb is shown in a mosque among the ruins of the old town. Pop. (est.) 15,000.

Nish'gar. See NASS INDIANS.

Nisibis, nĭs′ĭ-bĭs, Asia Minor, anciently an important town, the capital of Mygdonia, Mesopotamia, now the town of Nisibin, in the vilayet of Diarbekir (pop. 10,000). The cuneiform inscriptions found here refer to it as Nasibina. It was frequently taken and retaken in the wars between the Romans and the Parthians, and afterward between the Romans and Persians, until it was given up to the latter by the Emperor Jovian in 363. The Persians were defeated here by Belisarius in 541, and by Marcian in 573.

Nisqualli (nĭz′kwä-lē) **Indians,** an American tribe of the Salisban family formerly residing on Puget Sound, Washington. They joined the Puyallup and other tribes in signing the Medicine Creek Treaty of 1854. In 1858, the Nisquallis took part in the general Indian war in the Northwest. There are to-day less than 100 survivors of the tribe.

Nisroch, nĭs′rŏk, in Assyrian mythology, a god, in whose temple, and in the very act of idolatry, Sennacherib was slain by his own sons (2 Kings xix. 37). The name signifies "the great eagle"; and the earlier Assyrian sculptures exhumed at Nineveh have many representations of an idol in human form, but with the head of an eagle. Among the ancient Arabs, also, the eagle occurs as an idol. Historians have, however, long accepted Joseph Halévy's conjecture that the word is a corruption of Nusku; while it has also been held to be identical with Marduk of the later Babylonian pantheon.

Nissa, nĕs′sa, Servia. See NISH.

Nissen, Heinrich, hīn′rĭH nĭs′sĕn, German archæologist: b. Habersleben, Germany, 3 April 1839. He was educated in Kiel and Berlin, and in 1869–76 was professor in Marburg and subsequently held professorships in Göttingen, Strasburg, and Bonn. He wrote: 'Kritische Untersuchungen über die Quellen der 4. und 5. Decade des Livius' (1863); 'Italische Landeskunde' (1883); 'Grieschische und Römische Metrologie' (1887); etc.

Nisus, nī′sŭs, Greek mythological king of Megara. His life depended upon a lock of gold or purple hair and of this his daughter Scylla deprived him when Minos, her lover, laid siege to Megara. This act of treachery enabled Minos to take the city, but shocked by the conduct of Scylla, he had her tied to the stern of his ship and by some accounts she was drowned in the Saronic Gulf. Another legend makes her swim after Minos' ship and she is then pounced upon by her father in the form of a sea-eagle, whereupon she changes into the sea-bird Ciris, and is ever after pursued by him.

Nithard, nē-tär′, Frankish historian: b. about 795 A.D.; d. near Angoulême 15 May 843. He was a grandson of Charlemagne. He was in the service of Louis the Pious, and later of Charles the Bald, whose cause he espoused during the dissensions between the sons of Louis. He fought in the battle of Fontenay, and was killed in a battle against the Northmen. At the command of Charles the Bald, he wrote a history of the times 'De dissensionibus filiorum Ludovici Pii ad annum usque 843,' which though naturally partisan, is a valuable source for the study of early mediæval history. It is contained in the 'Monumenta Germaniæ Historica,' published by Pertz (1870); and was also published by Holder (1882), and in German by Jasmund (1889).

Nithsdale, nĭths′dāl, **William Maxwell,** 5th EARL OF, Scottish Jacobite: b. Scotland 1676; d. Rome, Italy, 20 March 1744. He joined the Jacobites in 1715 and served under Forster and Derwentwater at Preston where he was captured. He was imprisoned in the Tower and sentenced to death, but assisted by his wife he made his escape in woman's clothing the night preceding the day set for his execution, though had they known it he had been reprieved. They then went to Rome where Nithsdale joined the followers of the Pretender. He was the "Willie" of 'Kenmure's up and awa'; and the story of his escape written by his countess will be found in 'Transactions of the Societies of Antiquaries of Scotland,' Vol. I.

Nitocris, nī-tō′krĭs, Egyptian queen, the last of the Sixth Dynasty. She succeeded her brother Menthuophis, whose assassination she avenged by drowning all who had any complicity in it. She was buried in the third in size of the greater pyramids, which she had enlarged. She was supposed by the Greek historians to be Rhodopis, "rosy-cheeked," a Greek courtesan, with whom the king fell in love from the sight of her lost slipper.

Nitrate of Silver, a compound of silver and nitric acid, having the formula $AgNO_3$. It may be prepared by dissolving pure silver in warm nitric acid that has been diluted with two or three times its own weight of water. The solution is evaporated to dryness, and the resi-

due gently heated until all the nitric acid has been expelled, after which it is dissolved in water and crystallized; the silver nitrate being then obtained in the form of white tabular crystals belonging to the trimetric system. Nitrate of silver is readily soluble in water and in alcohol. It melts at 424° F., and when cast into sticks it constitutes lunar caustic, being used in this form as a cauterizing agent. Its cauterizing effect depends upon the fact that it forms, with the albumen of the flesh, an insoluble albuminate of silver. Nitrate of silver, especially in the presence of organic matter, is blackened by exposure to light, and on account of this property it is used in the preparation of indelible inks for marking linen, and as a basis for dyes to color the hair black. It was much used in photography in the days of the old "wet-plate" process, and is still employed in sensitizing the paper upon which the positive pictures are printed. The black stains that it leaves upon the hands may often be removed by the application of cyanide of potassium; but it should be remembered that cyanide of potassium is a violent poison, and that it must be used with extreme care.

Medical Uses.—Nitrate of silver is officinal in two forms, the heavy crystalline salt, readily soluble in its own weight of water, and the lunar caustic above mentioned. Applied to the skin, it produces a brownish-black stain due to the formation of oxide of silver. The crystals only are used internally either in pills or solutions. Nitrate of silver as ordinarily applied to an inflamed mucous membrane is more of an astringent than of an irritant. Applied locally as a caustic, its action is superficial, coagulating the albumen and so forming a protective coating. Internally it is used (combined with an anodyne) in gastric ulcer, gastritis, intestinal ulcerations and dysentery. Salt and soap checks its action. Externally in stick form, it has been used to prevent the pitting of smallpox. In solution it is employed to quiet the pain and relieve swelling in cases of felon, orchitis, and epididymitis; in inflammation of the mouth, pharynx, and larynx; in whooping cough, pruritus ani, bed-sores, boils, granular lids, conjunctivitis, etc. Nitrate of silver should not be used internally for too long a time, as it is slowly eliminated from the body. Argyria or chronic poisoning is liable to result from such use of the remedy. See SILVER-POISONING.

Nitrate of Soda, Sodium Nitrate, or **Chile Saltpeter,** a compound of sodium and nitric acid, having the formula $NaNO_3$. It may be prepared by neutralizing nitric acid with sodium hydrate or sodium carbonate, and evaporating the solution; but it occurs native and in large quantities, in the northern part of Chile, and in the neighboring parts of Peru and Bolivia. Deposits of it are also known in Humboldt County, Nev., and in San Bernardino County, Cal. The Chilean deposits occur at a height of 3,300 feet above the sea, but they are undoubtedly of marine origin, since they contain the remains of recent shells. Nitrate of soda, as it occurs in nature, may be purified by repeated crystallization from its aqueous solution. It crystallizes in rhombohedral forms, and is isomorphous with calcite; but in nature it is usually found massive, or in beds, or as an incrustation. The crude substance is valuable as a fertilizer (see MANURES AND MANURING), and it is also used extensively as a source of nitric acid and of nitre (qq.v.).

Nitrates, salts of nitric acid. See NITRATE OF SILVER; NITRATE OF SODA; NITRE; NITRIC ACID.

Nitre, nī'tẽr, **Niter, Nitrate of Potash, Potassium Nitrate,** or **Saltpeter,** a compound of nitric acid and potassium, having the formula KNO_3. It occurs native in many places as an incrustation upon the soil, notably in Spain, Egypt, Persia, and India. It also occurs in considerable quantities in the caverns of Kentucky and Tennessee, and elsewhere along the Mississippi Valley. It is obtained on a commercial scale from these various sources, but it is also prepared in vast amounts from native nitrate of soda (q.v.). When hot concentrated solutions of nitrate of soda and potassium chloride are mixed, nitrate of potash and chloride of sodium (common salt) are formed, the latter separating out in the form of crystals when the solution cools, while the nitrate of potash remains in solution. Nitre has mild antiseptic properties, and it is also used in dyeing, in metallurgy, in medicine (as a diuretic and diaphoretic), and in the preparation of fluxes. It is used in the arts most commonly, however, in the manufacture of gunpowder (q.v.). For "sweet spirits of nitre" see NITROUS ETHER.

Nitric Acid (Latin, "from nitre"), in chemistry, a compound of nitrogen, oxygen and hydrogen, having the formula HNO_3, and possessing strongly acid properties. It appears to have been discovered in the 9th century, by Geber, the "father of chemistry," who describes a method of preparing it by distilling a mixture of nitre, alum and copperas (sulphate of iron). The modern method of preparing it by the action of free sulphuric acid upon nitre was apparently first described by Glauber, about the middle of the 17th century. Lavoisier proved that the acid contains oxygen, and Cavendish, in 1785, succeeded in preparing nitre by passing electric sparks through a mixture of oxygen and nitrogen, in the presence of a solution of caustic potash. Free nitric acid occurs in rain-water in exceedingly small amounts, and its salts are formed, in the soil, by the bacterial oxidation of nitrogenous organic matter. (See NITRIFICATION.) Commercially, nitric acid is manufactured by distilling sodium nitrate ("Chile saltpetre") with strong sulphuric acid. The sulphuric acid (H_2SO_4) unites with the sodium nitrate ($NaNO_3$) to form nitric acid (HNO_3) and acid sulphate of sodium ($HNaSO_4$), as indicated by the equation: $NaNO_3 + H_2SO_4 = HNO_3 + HNaSO_4$. When the temperature is sufficiently raised, the acid sulphate of sodium combines with another molecule of the sodium nitrate to form normal sodium sulphate (Na_2SO_4), another molecule of nitric acid being liberated at the same time, as indicated by the equation:

$$HNaSO_4 + NaNO_3 = Na_2SO_4 + HNO_3.$$

The temperature is not always carried to the point where this last reaction occurs, however, because although the yield is larger, the product is more largely contaminated with objectionable impurities, and the residual "cylinder cake," or "nitre cake," left in the retorts, is harder to remove. The distillation is commonly carried

out in iron retorts, iron not being seriously attacked by concentrated sulphuric or nitric acids. The nitric acid which distils off is washed by passing it through a series of double-necked iron bottles ("Woulfe's bottles"), containing, each, a small quantity of water. The distillate is finally condensed, then constituting the crude, fuming acid. Nitric acid, as thus manufactured, is yellowish in color, and contains, as its principal impurities, chlorine, hydrochloric acid, iodic acid, peroxid of nitrogen, sulphuric acid, sodium sulphate, and iron compounds; some of these being distilled over, and others carried over mechanically. Most of the impurities may be removed by re-distillation. A third distillation then follows, after the addition of an equal volume of concentrated sulphuric acid to retain the major part of the water. By this means a tolerably pure nitric acid can be had, though it is still yellowish from the presence of lower oxids of nitrogen. These may be removed by warming the acid slightly, and passing through it a stream of air, or (preferably) of carbon dioxid gas. Any nitrous acid that may be present may be removed by distillation with a small quantity of urea, which decomposes the nitrous acid with liberation of carbon dioxid, water, and free nitrogen.

Nitric acid, perfectly free from water, has not yet been prepared, although specimens have been obtained containing from 99.5 to 99.8 per cent of HNO_3. When free from all impurities except water, nitric acid is a colorless liquid, which gradually decomposes in a strong light, with evolution of oxygen, water, and nitrogen peroxid (NO_2), becoming yellow from the presence of the peroxid. The most highly concentrated acid freezes at about 50° F. below zero, and boils at about 187° F., although it begins, below the boiling temperature, to decompose into nitrogen peroxid, water, and free oxygen. Concentrated nitric acid may have a specific gravity as high as 1.552. Nitric acid was formerly known as "spirit of nitre," and (when diluted) also as "aqua fortis" (that is, "strong water"). It is an active oxidizing agent, especially when warmed, owing to the facility with which it parts with oxygen. When mixed with hydrochloric acid, it is known as "nitrohydrochloric acid," "nitromuriatic acid," or "aqua regia," the latter name being given on account of the power that the mixture has of dissolving gold. The powerful solvent action of nitrohydrochloric acid is due to the fact that it contains free chlorine gas, liberated from the hydrochloric acid by the oxidizing action of the nitric acid upon the hydrogen of the hydrochloric acid. Nitric acid and nitrohydrochloric acid are both used in medicine, in a highly dilute state, as appetizers and diuretics.

Nitric acid is used in large quantities in chemical industries of all kinds. It is of the greatest importance in the manufacture of the coal-tar colors, and of many of the modern high-power explosives. (See, for example, NITROGLYCERIN and GUNCOTTON.) With the metallic bases it forms a series of exceedingly important salts known as "nitrates." Practically all of the nitrates are crystalline and readily soluble, and they are characterized by marked decrepitation when heated upon charcoal before the blowpipe. Several of the nitrates are used in dyeing, notably those of aluminum, iron, and lead. Aluminum nitrate, $Al(NO_3)_3$, may be prepared by dissolving aluminum hydrate in dilute nitric acid, and crystallizing by evaporation. It crystallizes in rhombic prisms which contain nine molecules of water, are readily soluble, and melt at 99° F. Ferrous nitrate, $Fe(NO_3)_2 + 6H_2O$, is prepared by dissolving ferrous sulphide in dilute nitric acid, and slowly evaporating the solution at as low a temperature as possible. Ferric nitrate, $Fe(NO_3)_3 + 9H_2O$, crystallizes in rhombic prisms, and may be prepared by dissolving metallic iron in nitric acid, adding more acid, and finally cooling the solution. It is readily soluble in water, but nearly insoluble in cold dilute nitric acid. Normal lead nitrate, $Pb(NO_3)_2$, may be obtained in the form of octahedral crystals, by evaporating a solution of lead carbonate in dilute nitric acid. The nitrates of barium and strontium are used to a large extent in pyrotechny, on account of the beautiful colors that they yield. They may be prepared by adding, to the corresponding carbonates, not quite enough dilute nitric acid to decompose the whole of the salt, and subsequently filtering and crystallizing. See also NITRATE OF SILVER; NITRATE OF SODA; NITRE.

A. D. RISTEEN.

Ni'trides, in chemistry, compounds consisting of nitrogen and one other element. They are usually prepared by the action of ammonia upon metallic oxids or chlorides, but in some cases they may be prepared by the direct combination of free nitrogen with the other constituent. Nitride of boron ("æthogen"), for example, has the formula BN, and is formed when boron is heated in nitrogen gas. Magnesium nitride, a crystalline substance having the formula Mg_3N_2, is also formed when metallic magnesium is heated to redness in an atmosphere of nitrogen. Ramsay, Raleigh, Travers, and others, took advantage of this latter fact for effecting the absorption of the nitrogen of the air, in their researches upon argon, helium, and the other rare gaseous elements of the atmosphere. (See ARGON.) The nitrides of the metals are mostly decomposed by heat, and sometimes with explosive violence. Magnesium nitride, however, is quite stable.

Nitrifica'tion, the process by which nitrates are formed, either in the soil or elsewhere, by the putrefactive or fermentive decay of nitrogenous organic matter, or by the oxidation of nitrogen itself. It has long been known that nitrates are formed in the soil, and in India, as well as in Spain and certain other parts of Europe, nitrate of potassium ("nitre") is still manufactured to some extent by mixing porous soil with manure and other organic refuse, adding wood ashes (as a source of potassium), and allowing the mass to stand in heaps for two years or so. Under suitable conditions of temperature and moisture, the yield may be as much as ten pounds of crude nitre per ton of earth. Analogous changes go on, from year to year, in all fertile soil, and it was formerly believed that the natural conversion of nitrogenous matter into nitrates is due to the fact that the soil, by a sort of capillary action, condenses air within its pores; oxidation being thereby promoted because the air held by the soil, being denser than normal atmospheric air, contains more oxygen per unit of volume.

In 1862, however, Pasteur suggested that nitrification is effected through the agency of bacteria, or other forms of microscopic life; and in 1877 Schlösing and Müntz established this view upon a firm foundation, by means of many ingenious experiments. It has also been further and most convincingly established by Warington, Munro, Winogradsky, P. F. Frankland, G. C. Frankland, and others. It has been shown, for example, that nitrification is arrested by powerful antiseptics, and that it proceeds most actively at about 100° F., and less rapidly both at higher and at lower temperatures. Furthermore, if soil or sewage be raised in temperature to 212° F., so as to destroy all life that may be present, nitrification at once stops, and it will not proceed again when the temperature is restored to 100° F., even in the presence of abundance of air that has been passed through germ-proof filters. If the sterilized mass be "sown" with the nitrifying agents, however, by the addition of a small quantity of unsterilized soil or sewage, nitrification is at once resumed, and thereafter proceeds normally. Certain conditions are essential to active nitrification, in addition to a suitable temperature, the free access of oxygen, and the actual presence of a sufficient number of the live and active organisms. It is essential, for example, that the soil or other medium in which the nitrification occurs shall be slightly alkaline, and this implies the presence of a base such as potash or carbonate of lime, in sufficient quantity to fix the nitric acid as it is formed; for if no such base is present, the medium soon becomes acid, so that the organisms cease their activities. It is usually held that some quantity of organic carbon must also be present, in order to furnish food for the nitrifying organisms; but it appears that this is not essential in all cases, because certain forms of life have been found to be capable of nitrifying inorganic solutions, obtaining their carbon from carbon dioxid gas. In the presence of a considerable amount of organic carbon, especially when the conditions are otherwise unfavorable to nitrification, an inverse process, known as "denitrification," is likely to result, such nitrates as happen to be present being thereby reduced to compounds that are less highly oxidized. Denitrification also appears to be due to the activities of special microorganisms, and whether the nitrates of a soil increase or decrease depends upon which of the two antagonistic kinds of organism is most highly favored by the conditions. Moisture is essential in both cases; but its absolute amount is of the greatest importance. Nitrification may be proceeding rapidly in a soil that is moderately moist and well aerated, and yet the same soil, when thoroughly waterlogged, may be a vigorously denitrifying medium. Nitrification proceeds best in the dark, and strong light checks it in a marked manner, or even stops it altogether. In nature, nitrification is most active within a few inches of the surface of the ground, and it takes place only with exceeding slowness at a depth of two or three feet. Some microorganisms transform nitrogenous compounds into compounds of ammonia, some transform ammoniacal salts into nitrites, and some transform nitrites into nitrates. In nature, it is probable that all these processes go on simultaneously. It was long believed that the free nitrogen of the air does not take part in the nitrification processes of the soil. It is now pretty generally admitted, however, that certain microorganisms actually possess the power of absorbing free nitrogen, and fixing it in the form of a chemical compound. We do not yet know how general this power may be, but it appears to be exhibited, beyond dispute, by some of the microscopic forms of life that live, perhaps parasitically, upon the roots of the pea and certain similar plants.

Consult: Aikman, 'Manures and Manuring'; Conn, 'Agricultural Bacteriology'; Roberts, 'Fertility of the Land.'

Ni'trile, in chemistry, a compound which may be regarded as derived from ammonia, NH_3, by replacing the three hydrogen atoms by a single trivalent organic radical. (Compare AMIDE.) They have the general formula XCN, where X represents methyl (CH_3), ethyl (C_2H_5), or some similar monovalent alcoholic radical, and they may therefore be regarded as alkyl cyanides. They may be prepared by distilling potassium-alkyl sulphates with potassium cyanide, the general reaction being $XKSO_4 + KCN = K_2SO_4 + XCN$. Acetonitrile, for example, which has the formula $CH_3.CN$, may be prepared by distilling dry potassium-methyl sulphate, $CH_3.KSO_4$, with dry potassium cyanide, KCN. Acetonitrile is also known as methyl cyanide, and is a colorless, inflammable liquid with an ethereal odor, mixing readily with water and with alcohol, having a specific gravity of 0.80, and boiling at about 178° F.

Ni'trite of Amyl. See AMYL NITRITE.

Nitrites, salts of nitrous acid (q.v.).

Nitro-ben'zene, or **Nitro-benzol,** a liquid chemical substance having the formula $C_6H_5(NO_2)$, which is formed by the action of fuming nitric acid upon benzene. See ANILINE and BENZENE.

Nitro-cel'lulose, a compound of nitric acid with cellulose, in which the hydroxyl of the cellulose is more or less completely replaced by molecules of NO_2. An exchange of NO_2 for OH always occurs when cellulose is treated with nitric acid, but the extent of the nitration depends upon the circumstances of the treatment. The nitro-celluloses are more properly described as "cellulose nitrates," and five of them are known. Of these, collodion pyroxylene and guncotton are the most important. Collodion pyroxylene is a mixture of the tetra-nitrate and trinitrate, and guncotton (which is sometimes described as the tri-nitrate) is really the hexanitrate, its chemical formula being $C_{12}H_{14}O_4.(NO_3)_6$.

Ni'tro-Compounds, in chemistry, compounds in which one or more atoms of hydrogen are replaced by an equal number of nitroxyl (NO_2) radicals, the nitroxyl radicals being directly connected with carbon by means of their nitrogen atoms. Many of the nitro-compounds are of great importance in the chemistry of coal-tar derivatives. Nitro-benzene, $C_6H_5.NO_2$, for example, which is obtained by the action of nitric and sulphuric acids upon benzene, is the source from which commercial aniline is manufactured. See ANILINE and BENZENE. Consult, also: Benedikt, 'Chemistry of the Coal-Tar Colors.'

Nitro-hydrochlo'ric Acid, Nitro-muriatic Acid, or **Aqua Regia,** a mixture of nitric and hydrochloric acids, formerly known as "aqua regia," or "royal water," on account of its power to dissolve gold. See NITRIC ACID.

Ni'trogen (Greek, "producing nitre"), a gaseous, non-metallic element existing in nature in the free state, and also occurring, in chemical combination, in numerous minerals. It is an essential constituent of many of the animal and vegetable tissues, especially of the proteids, or albumen-like substances. It exists in the free state in the earth's atmosphere, of which it constitutes 77 per cent by weight, or about four fifths by bulk. Nitrogen is a colorless gas, without taste or odor, and it will neither burn nor support combustion. It is not poisonous (as is evident from its presence in the air), and when inhaled in the pure state it produces asphyxia only by excluding oxygen from the lungs. Nitrogen is slightly lighter than air, its density being approximately 0.97247, when that of air is taken as unity. According to Jolly, a cubic decimetre of nitrogen, under a pressure of 760 millimetres of mercury at the sea-level in lat. 45°, weighs 1.25746 grams. The specific heat of nitrogen at constant pressure, as compared with an equal weight of water, is 0.2368; and, according to Chappuis, if a given mass of the gas, at an initial temperature of 32° F. and a pressure of one metre of mercury, be heated at constant volume to 212° F., its pressure becomes equal to that due to 1.36745 metres of mercury. (This last-given constant was determined with the greatest care, as it is of the highest importance in modern precise thermometry by means of the nitrogen thermometer.) Nitrogen can be liquefied by the simultaneous application of great cold and great pressure. Sarrau gives its critical temperature and pressure as 191° F. below zero, and 42 atmospheres, respectively. Rutherford, in 1772, showed that the expired air of men and animals contains a gas which will not support combustion, and which is nevertheless different from carbon dioxid, since caustic potash will not absorb it. Shortly afterward Lavoisier proved that this gas exists in the free air, and since it will not support life he called it "azote" (Greek, "not supporting life"), a name by which it is still known in France, and some of whose derivatives also survive in English. ("Azo-benzene," for example.) The modern word "nitrogen" is due to Chaptal.

Chemically, nitrogen has the symbol N, and an atomic weight of 14.04 if O = 16, or 13.93 if H = 1. It may be prepared in a state of approximate purity from the atmosphere, by the following process: A slow stream of air is passed through tubes of moistened potassium hydrate to absorb carbon dioxid, then through tubes of calcium chloride to absorb moisture, then through a tube containing red-hot copper turnings to remove the oxygen, then through a solution of chromium chloride to remove the last traces of oxygen, then again through tubes of calcium chloride to remove moisture, and lastly over phosphorus pentoxid to complete the removal of moisture, and also to absorb any ammonia that might be present. The nitrogen so obtained will still contain argon, helium, neon, and the other recently discovered inert gases of the atmosphere, however; and if these are objectionable, it is best to prepare the nitrogen from some of its compounds, from which argon and similar gases are necessarily absent, on account of their chemical inertness. Ammonium nitrite, $NH_4.NO_2$, is a convenient substance for this purpose, because it is resolved, by heating, into water and free nitrogen, as indicated by the equation $NH_4.NO_2 = 2H_2O + 2N$.

Free nitrogen does not exhibit any marked chemical affinity, though it can be made to combine with other elements in various ways, and its compounds are often exceedingly active, as is familiarly illustrated by nitric acid and by ammonia. Five oxids of nitrogen are known. (1) *Nitrous Oxid,* N_2O, for which see the article NITROUS OXID. (2) *Nitrogen Dioxid,* or Nitric Oxid, NO, discovered by Priestley, who called it "saltpeter-gas." This is a colorless gas, prepared by acting upon metallic copper with cold dilute nitric acid, HNO_3; copper nitrate, nitrogen dioxid and water being formed, as indicated by the equation

$$3Cu + 8HNO_3 = 3Cu(NO_3)_2 + 2NO + 4H_2O.$$

Nitrogen dioxid combines directly and readily with oxygen, the combination taking place promptly upon contact with common air, higher oxids of nitrogen being formed. The dioxid may be liquefied by the application of cold and pressure, but there is still much uncertainty about its critical point. The liquefied gas freezes at about 270° F. below zero. (3) *Nitrogen Trioxid,* or Nitrogen Sesquioxid, N_2O_3, may be prepared (though not in a strictly pure state) by the action of nitric acid upon starch, or upon arsenic trioxid. It is a reddish gas, which condenses to a volatile blue liquid upon being cooled by a freezing mixture to 0° F. Nitrogen trioxid also dissolves in ice-cold water with the formation of a blue liquid containing nitrous acid, HNO_2. (See NITROUS ACID.) (4) *Nitrogen Peroxid,* NO_2, formerly known as the "dioxid." This oxid may be prepared by heating dry nitrate of lead, which then breaks up into lead oxid, oxygen, and nitrogen peroxid, as indicated by the equation $2Pb(NO_3)_2 = 2PbO + 4NO_2 + O_2$. It is a dark orange-colored gas, which has the molecular formula N_2O_4 at low temperatures, for which reason it is often called the "tetroxid." At 300° F. the gas has the molecular formula NO_2, as is proved by its density; and at ordinary temperatures it consists of a mixture of NO_2 and N_2O_4. At about 370° F. a further dissociation into NO and O begins, this increasing as the temperature rises, until, at about 1,150° F., the dissociation into NO and O is complete. Nitrogen peroxid is easily liquefied and solidified. At temperatures lower than 14° F. it is a white, deliquescent, crystalline solid. At 16° F. this melts to a colorless liquid, which becomes yellow when warmed to 32° F., and orange at 70° F. Under ordinary atmospheric pressure it boils at about 72° F., with the evolution of the gaseous peroxid. (5) *Nitrogen Pentoxid,* or Nitric Anhydride, N_2O_5, may be prepared by dehydrating concentrated nitric acid by the cautious addition of phosphorus pentoxid, or by passing chlorine gas over dry silver nitrate. In the latter case the reaction is $2AgNO_3 + 2Cl = 2AgCl + N_2O_5 + O$. The pentoxid is solid at ordinary temperatures, and may be obtained in the form of white, lustrous, translucent prisms, which have a specific gravity of

about 1.64, and melt at 86° F. with partial decomposition into the peroxid and free oxygen. At about 115° F. the liquid obtained by melting the crystals boils. The pentoxid combines with water to form nitric acid (q.v.).

Nitrogen combines directly with certain of the other elements to form compounds known as nitrides (q.v.). With chlorine it forms an oily liquid known as chloride of nitrogen, which has the formula NCl_3, and may be prepared by passing chlorine gas through a solution of sal ammoniac. Chloride of nitrogen is one of the most dangerous explosives known, decomposing with fearful violence upon the slightest touch, and often with no assignable cause whatever. Several compounds of hydrogen with nitrogen are known, of which ammonia, NH_3, is the most familiar and also the most important.

See AMIDE; AMINE; AMMONIA; NITRIC ACID; NITRIFICATION; NITROUS ACID; NITROUS OXID; etc.

Nitroglyc'erin, or **Glonoin,** a powerful explosive discovered by Ascanio Sobrero in 1846, and first produced commercially by Emmanuel and Alfred B. Nobel, at Helenborg, Sweden, in 1862. The process of manufacture was much improved by George M. Mowbray of North Adams, Mass., and Walter N. Hill of the U. S. Torpedo Station, at Newport, R. I., these improvements yielding a product of greater purity, and also overcoming many of the dangers attending the manufacture, transportation and use of the substance. Nitroglycerin is manufactured by treating glycerin with a mixture of concentrated nitric and sulphuric acids, but the proportions of the material used and the methods of operation are different in different countries. In the United States the acids are usually mixed in the proportion of 2 parts by weight of nitric to 3 parts by weight of sulphuric, so as to contain 61.9 per cent of real H_2SO_4, 34.5 per cent of HNO_3, and not more than 0.7 per cent of N_2O_3. These "mixed acids" are shipped from the acid works in iron drums holding 1,500 pounds each, this weight being a convenient charge for one run in the nitroglycerin converter. The "converter" or "nitrator" is a closed cylindrical vessel of lead, standing within a wooden one. The mixed acids are introduced by a pipe at the top of the converter, and the glycerin is forced into the vessel at the bottom, by means of compressed air. The fumes produced by the reaction are carried off through a "fume pipe," which is provided with a window to view the gases. The reaction between the glycerin and the acids causes the evolution of considerable quantities of heat; and to prevent the temperature of the converter from rising to the danger point, cold water is continually passed through the space between the lead cylinder and the wooden one, and also through a cooling coil of lead pipe, which is placed within the lead cylinder. Compressed air is also injected directly into the mixture to aid in the cooling, and extra air pipes are provided, for use in case the rise of temperature cannot be controlled by the means that are normally sufficient. The temperature of the mixture is continuously observed, by means of sensitive, specially constructed thermometers, which enter the converter through the top. In operating the process, the mixed acids are run into the converter first, the cooling water is next turned on, and, lastly, the glycerin is slowly introduced at the bottom. When the materials are pure, and no particle of water is allowed to enter the mixture, and the temperature is not permitted to rise above 86° F., this part of the operation may be regarded as reasonably safe.

When the conversion is completed, the charge of the converter is run off into a "separator," which is a cylindrical leaden vessel provided with windows, with a vent pipe for the escape of vapors, and with an injector pipe, through which compressed air may be introduced for cooling purposes, in case any tendency toward rise of temperature is observed. When the charge is allowed to stand, the nitroglycerin rises to the top of the separator, and the spent acids, by reason of their greater density, sink to the bottom. The separation being nearly complete, the nitroglycerin is drawn off through an upper spigot, and the spent acids are drawn off at the bottom and passed to a second separator, for the removal of the last traces of nitroglycerin that they contain. The nitroglycerin is now repeatedly washed with water, then with a solution of soda ash, and again with water, until the last traces of acid are removed from it. The spent acids are sent to the "regaining" works, where the sulphuric acid (which is not destroyed in the process) is recovered for further use. The small quantity of nitric acid that remains unused is also recovered in a dilute form, and used for other purposes. Theoretically, 100 parts by weight of glycerin should yield 246 parts of nitroglycerin; but the yield in the United States is only from 200 to 220 parts.

Nitroglycerin is also known as "glonoin," "Nobel's blasting oil," and "trinitroglycerin." It was originally supposed to be a nitro-substitution compound, like many other substances produced by the action of nitric acid upon organic compounds, and hence the name it now commonly bears. But Berthelot has shown that its reactions are those of a salt or ester of nitric acid, and its correct chemical name is now admitted to be "glyceryl trinitrate," or "propenyl trinitrate." "Glyceryl" or "propenyl" is the name of the organic radical C_3H_5, and ordinary glycerin, $C_3H_5(OH)_3$, is the hydrate of this radical. Nitroglycerin has the formula $C_3H_5(NO_3)_3$, and is formed from nitric acid and glycerin in accordance with the equation $C_3H_5(OH)_3 + 3HNO_3 = C_3H_5(NO_3)_3 + 3H_2O$.

When chemically pure, glyceryl trinitrate is a colorless, odorless, transparent, oily liquid, but commercial nitroglycerin varies in color between a hock-wine and a dirty yellow. It has a specific gravity of 1.599 when liquid, and 1.735 when frozen. It freezes at 46° F. if exposed for a long time to this temperature, forming long, whitish crystals, which melt again upon prolonged exposure to a temperature of 52° F. According to Hess it volatilizes completely upon continuous exposure to a temperature of 158° F., and Guttmann has found that dynamite (see below) loses 10 per cent of its nitroglycerin by an exposure of several days to a temperature of 104° F. Nitroglycerin is almost insoluble in water, but dissolves readily in wood alcohol, grain alcohol, ether, benzene, and many other organic liquids. It undergoes dangerous decomposition with explosion upon contact with

sulphuric acid (except under the conditions of manufacture described above), and it is also decomposed by alkalies and by alkaline sulphides. The safest way to destroy it is by treating it with a solution of ammonium sulphide, or, where the quantity is large, with spent lime from the purifiers of gas works. Nitroglycerin has a sweetish, burning taste, and is poisonous, producing extremely violent headaches when taken by the mouth, absorbed through the skin, or inhaled as vapor; though some persons, by constant association with it, become immune to its physiological effects. The antidotes are cold compresses, fresh air, black coffee, and morphine. It is used in medicine as a heart stimulant, in the treatment of angina pectoris, in the revival of the drowned, and as an antidote in cases of poisoning by carbon monoxid and water gas.

The critical temperature of decomposition of nitroglycerin is between 113° F. and 122° F. At 113° F. it keeps indefinitely if free from acid, but between that temperature and 122° F. it begins to decompose, and at 160° F. decomposition goes on actively. Pure nitroglycerin is not very sensitive to friction or moderate percussion, except when pinched between metallic surfaces, or struck a glancing blow. If placed upon an anvil and struck with a hammer, only the particle struck, as a rule, explodes, the remainder being scattered; but this is an unsafe experiment to try with a quantity of the explosive, because in some cases the whole mass will be exploded. Frozen nitroglycerin is in general less sensitive to shock than the liquid, but explosions have occurred which were believed to be due to the breaking of a crystal of the solid substance. When a small quantity of nitroglycerin is freely exposed to a flame, it burns brilliantly and without explosion; but when the experiment is tried with a larger quantity, explosion is likely to follow. A drop of nitroglycerin, when placed upon an iron plate and slowly heated, may volatilize completely without exploding; and if the drop is placed on an iron plate that is previously heated to incandescence, it will assume the spheroidal condition and volatilize without explosion; but if the plate be heated to a temperature just below incandescence the drop explodes violently upon contact with it. Nitroglycerin was at first exploded, in blasting, by means of a gunpowder fuse, and this method is still used to a limited extent with dynamite; but it is chiefly fired by means of a powerful detonator, by which its greatest explosive efficiency is realized.

Nitroglycerin is principally used in the manufacture of dynamite, explosive gelatine, gelatine dynamites, and smokeless powders such as ballistite and cordite. The liquid substance is used in torpedoes for oil wells, to remove the paraffin which clogs them or to shake the oil-bearing sandstone so as to secure a better flow of oil. Owing to the difficulty and danger of transporting and handling liquid nitroglycerin, attempts were early made to absorb the liquid by means of some substance which would not interfere with its explosive action, but which would form with it a solid body, or a powder, which could be handled more conveniently and safely. Many such absorbents have been tried, charcoal being the first; but Nobel found that a kind of infusorial earth, consisting chiefly of the silicious remains of diatoms, and known as "kieselguhr," is much superior to charcoal, and this substance is now largely used as an absorbent, in the manufacture of common "dynamite." Sawdust, especially in combination with certain chemical substances, is used as an absorbent to a considerable extent. "Dualin," for example, is a mixture of 50 parts of nitroglycerin, 30 of sawdust, and 20 of saltpeter, and "Atlas powder" and "Hercules powder" consist of nitroglycerin, carbonate of magnesia, wood fibre, and sodium nitrate. "Blasting gelatine," invented by Alfred Nobel, consists of nitroglycerin gelatinized by the addition of nitrated cotton fibre; its manufacture being based upon the fact that a mixture of mononitro-cellulose and dinitro-cellulose, when free from unnitrated cotton and from trinitro-cellulose ("gun-cotton"), dissolves in warm nitroglycerin with the formation of a gelatinous substance. "Gelatine dynamite" consists of a mixture of thin blasting gelatine with wood meal and saltpeter.

During 1900 the United States produced 35,482,947 pounds of nitroglycerin, of which 31,661,806 pounds were used in further manufactures.

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Nitrous Acid, an acid which has the formula HNO_2, but which is too unstable, in the free state, to admit of isolation. A blue, aqueous solution of it may be prepared by dissolving nitrogen trioxid in ice-cold water (see NITROGEN); but when this solution is warmed the nitrous acid decomposes into nitric acid, nitric oxid and water, as indicated by the equation $3HNO_2 = HNO_3 + 2NO + H_2O$. The salts of nitrous acid (which are known as "nitrites") are more stable, and certain of them occur in the soil as a result of the oxidation of organic matter. (See NITRIFICATION.) The nitrites of the metals are mostly soluble in water and in alcohol, their solutions being decomposed by boiling, or by the addition of dilute sulphuric acid. Potassium and sodium nitrites may be prepared by melting the corresponding nitrates with metallic iron, and crystallizing from solution in water. Silver nitrite, $AgNO_2$, may be prepared by heating starch with nitric acid, passing the resulting gas into a solution of caustic potash, neutralizing this with acetic acid, and finally adding a solution of silver nitrate. It crystallizes in small white crystals, is one of the most insoluble nitrites, and may be used in the preparation of many of the others. Ammonium nitrite, $NH_4.NO_2$, for example, may be obtained by adding a solution of silver nitrite to one of ammonium chloride (sal ammoniac). Nitrite of ammonium is used as a source of nitrogen, since it is decomposed by the action of heat into water and free nitrogen. Many of the organic derivatives of nitrous acid are also of importance. (See, for example, AMYL NITRITE and NITROUS ETHER.)

Nitrous Ether, or **Ethyl Nitrite,** the nitrite of the organic radical "ethyl." It has the chemical formula $C_2H_5NO_2$, and is usually prepared by acting upon ethyl alcohol with nitric acid. It is a yellowish liquid having a specific gravity of about 0.90, and boiling at 64° F. It mixes readily with alcohol, but only to a slight extent

with water. It decomposes when kept in contact with water, evolving nitric oxid (NO). When mixed with about 20 times its own volume of alcohol (rectified spirit), it is known as "spirit of nitrous ether," or "sweet spirit of nitre," and is used in this form as a diuretic and febrifuge.

Nitrous Oxid, or **Nitrogen Monoxid,** a gaseous substance having the chemical formula N_2O, and obtained by heating ammonium nitrate, $NH_4.NO_3$, as indicated by the equation

$$NH_4.NO_3 = N_2O + 2H_2O.$$

Care must be exercised in its manufacture, as ammonium nitrate, when heated, is liable to explosive decomposition. Nitrous oxid is a colorless gas, with a slightly sweet taste. It supports combustion nearly as well as oxygen, and when subjected to a pressure of 30 atmospheres at 32° F., it condenses into a colorless, mobile liquid. When inhaled, it is apt to produce exhilaration, for which reason it is commonly called "laughing gas." Sir Humphry Davy, in experimenting with nitrous oxid about the year 1801, discovered that it produces insensibility when inhaled for a sufficient time, and in recent years it has been used as an anæsthetic for dental work and other minor surgical operations. Davy himself suggested this use in the following words: "As nitrous oxid, in its extensive operation, seems capable of destroying physical pain, it may probably be used with advantage in surgical operations in which no great effusion of blood takes place." It does not appear that the gas was so used, however, until 1844. On 10 December of that year Dr. Gardiner Q. Colton gave a lecture on "Laughing Gas," in Union Hall, Hartford, Conn., administering the gas to several of his auditors, for the purpose of illustrating its peculiar properties. Horace Wells, a Hartford dentist, was present at the lecture, and was impressed by the practical possibilities that appeared evident to him. On the following day Wells obtained a supply of the gas from Colton, inhaled it himself until he became unconscious, and while he was in this condition Dr. Riggs extracted one of his teeth. When consciousness returned, a few minutes later, he exclaimed, "I didn't feel it! The greatest discovery of the age!" About the same time Dr. William T. G. Morton and Dr. Chas. T. Jackson, of the Massachusetts General Hospital, at Boston, introduced ether as an anæsthetic, and a patent for its use was issued to them in November 1846. There has been much bitter controversy concerning the priority of Wells and of Morton and Jackson, as regards the introduction of anæsthetic methods in surgery; but so far as nitrous oxid is concerned, the evidence appears to favor Wells. Morton and Jackson experimented chiefly with ether, a substance which Wells appears to have used in his practice only upon one occasion. Consult 'The Locomotive' for November, 1889.

Nitzsch, nĭtsh, **Karl Immanuel,** German theologian: b. Borna, Germany, 21 Sept. 1787; d. Berlin, Germany, 21 Aug. 1868. He was a son of Karl Ludwig Nitzsch and was educated in Wittenberg, becoming professor of a theological seminary in Berlin in 1817 and in 1822–47 he was professor at Bonn. He then returned to Berlin where he was professor, university preacher and a member of the high consistory. He published: 'System der christlichen Lehre' (1829); 'Praktische Theologie' (3 vols. 1847–67); etc.

Niu-chuang, nū-chwäng', **New-chwang,** or **Ying-tse,** China, a city of Manchuria, on the Liao-ho River, about 35 miles from its mouth. It is practically an inland city, but was chosen as one of the ports to be opened to foreign commerce by the treaty of Tien-tsin (1858). The foreign settlements and the trade, however, are at Ying-tse, near the river's mouth, which is known to Europeans as Niu-chuang. The port is connected by railway with Tien-tsin, and also with the great Siberian Railway. Though closed by ice in the winter months, it carries on an important trade. Ying-tse imports cotton, woolen, and silk goods, sugar, paper, metals, opium, tobacco, etc.; total value of imports in 1901, $2,146,868; and exports beans, silk, ginseng, skins, and horns; total value of exports in 1901, $3,651,880. The import of Indian opium has fallen from $2,860,000 in 1866 to about $40,000. Large quantities of salt are manufactured in the vicinity. The port was captured by the Japanese in March 1895, and was occupied by the Russians in 1900. See MANCHURIA. Pop. 60,000.

Niué, nē-oo'ā, **Niué-Fekai,** or **Savage Island,** in the South Pacific Ocean, politically dependent to New Zealand since 1900, is of ancient coral formation, 14 miles long, 10 miles wide, with a maximum altitude of 200 feet, and an area of 36 square miles. The soil is very productive, yielding cocoanuts, tara, yams, and bananas. Copra fungus, and straw hats are exported. Pop. (1903) 4,400, Malayo-Polynesians, all Christians, due to the labors of the London Missionary Society.

Niv'en, William, American mineralogist: b. Bellskill, Lanarkshire, Scotland, 6 Oct. 1850. After a common-school education in Scotland, he came to the United States in 1879, and pursued mineralogical investigations. He discovered four new minerals,—yttrialite, thorogummite, and nivenite in Llano County, Texas, in 1889, and aguilarite at Guanajuato, Mexico, in 1891. In 1891 he also found the remains of a prehistoric people, covering several hundred square miles in the state of Guerrero, Mexico. He was assistant commissioner of Arizona to the New Orleans Exposition.

Nivernais, nē-vĕr-nā, France, an ancient province corresponding nearly to the present department of Nièvre.

Nix, or **Nixie,** in German folk-lore, the name of water spirits (male and female), haunting rivers, brooks, ponds, and lakes. See also NICKER.

Nix'on, John, American military officer: b. Framingham, Mass., 4 March 1725; d. Middlebury, Vt., 24 March 1815. In the expedition against Cape Breton in 1745 he fought under Sir William Pepperell and was at the capture of Louisburg. He joined the colonial forces at the outbreak of the American Revolution and fought at the battle of Lexington, and at Bunker Hill he commanded a regiment. He was made brigadier-general in 1777 and was given command of Governor's Island in New York harbor. He served under General Gates in the battle of Stillwater, and in 1780 failing health compelled his retirement.

Nixon, John, American soldier: b. Philadelphia, Pa., 1733; d. there 31 Dec. 1808. He was early prominent in opposing the taxation demands of England, and in 1774 became a member of the first committee of correspondence in Pennsylvania; and was also a member of the committee of safety. In 1775 he became lieutenant-colonel of a battalion which he led at the battle of Princeton in 1777. In 1776 he commanded at Fort Island, and later in the same year was placed in command of the guard of the city of Philadelphia; he was the first to publicly proclaim the Declaration of Independence in the city on 8 July. He served in the army till 1780, and was a member of the navy board and director of the provision supply. He was one of the organizers of the Bank of North America, and its president from 1792 to 1808.

Nixon, Lewis, American shipbuilder: b. Leesburg, Va., 7 April 1861. He was graduated from the United States Naval Academy in 1882, and was then sent to the Royal Naval College at Greenwich, England, to take a special course in naval architecture from which he was graduated in 1885. In 1884 he had been appointed to the construction corps of the navy, and on his return from abroad was ordered to duty in connection with the building of the cruisers Chicago and Boston; he was later superintending constructor for the navy at the Cramp shipyard, and assistant constructor at the Brooklyn Navy Yard. In 1890 he designed the battleships of the Indiana class, and when the contract for these vessels was awarded to the Cramp shipyard, he resigned from the navy to become superintending constructor there. He retained this position until 1895, when he leased the Crescent shipyard at Elizabeth, N. J., where he built 100 vessels within six years, including the sub-marine torpedo boat Holland. In 1902 he became president of the United States Shipbuilding Company, which includes the Crescent shipyard, the Eastern Shipbuilding Company, and others; and he is also connected with other manufacturing interests. In politics he has been allied with the Democratic party; was appointed a commissioner of the East River Bridge in 1898; and in November 1901 succeeded Richard Croker as leader of Tammany Hall, resigning the position in May of the next year; he has also been chairman of the finance committee of the Democratic Congressional Campaign Committee.

Nixon, Oliver Woodson, American journalist: b. Guilford County, N. C., 25 Oct. 1825. He was graduated from Farmers' College, Ohio, in 1848, and from Jefferson Medical College, Philadelphia, in 1854. During the Civil War he was medical director of the Army of Missouri and in 1870 established the Cincinnati *Evening Chronicle.* With his brother, W. P. Nixon (q.v.), he merged it with the Cincinnati *Times,* and in 1878 they purchased the *Inter-Ocean* of Chicago, of which he has since been literary editor. He has published 'How Marcus Whitman Saved Oregon for the Union' (1895).

Nixon, William Penn, American journalist: b. Fountain City, Wayne County, Pa. He was graduated from Farmers' College, Ohio, in 1854 and from the law school of the University of Pennsylvania in 1859. He practised his profession in Cincinnati till 1860 and sat in the Ohio Legislature 1865–8. He was business manager of the Cincinnati *Chronicle,* 1868–72, and since the date last named has been associated with the Chicago *Inter-Ocean,* which he purchased with his brother O. W. Nixon (q.v.) as publisher, manager and editor. In 1897 he was appointed collector of the port of Chicago.

Niza, nēt'sä, **Marcos de** (also called FRAY MARCOS), Italian missionary in America: b. Nice at the beginning of the 16th century; d. between 1550 and 1570. He gets his name, de Niza, from the city of Nice, where he lived and entered the Franciscan Order. His governor-general Antonio de Mendoza, on the request of Marcos' bishop and friend Bartolome de las Casas, sent him about 1531 to New Galicia in order to reassure the Indians there that the purpose of the Spaniards was simply to convert the natives, not to enslave or conquer them. Fray Marcos lived successively in Peru, Guatemala and Mexico, and in 1539 undertook to explore the Northwest and to discover the truth of the story told by Cabeza de Vaca of the seven cities of Cibola and their golden wealth. Niza probably made his way into Arizona, and is frequently called the "discoverer of Arizona." Upon his return he published a book locating the "seven cities," for which he must have mistaken the Zuñi pueblos. But the hopes to which he roused Mendoza were shattered by the expedition led by Coronado in 1540, which found no gold in Cibola. Niza's 'Descubrimiento de las siete ciudades' was edited by Ramusio, but is most accessible in a French version (1838).

Nizami, nĭ-zâ-mē' (full name ABU MOHAMMED BEN YUSUF SHEIK NIZAM-ED-DIN), Persian poet: b. Western Persia 1141; d. Ganjah 1203. Besides a 'Divan,' or collection of lyrics, he wrote five larger poems, upon which his poetic fame rests, and which in Persia are regarded as masterpieces which no subsequent attempts have been able to equal. These poems are (1) 'Makhzan-al-asrar' ('Storehouse of Mysteries'), a didactic poem, in which theoretical doctrines as to ethics alternate with historical details, anecdotes, and fables; (2) 'Khusrau and Shirin,' a romantic epic, which has for its subject the love of the Persian king Khusrau for Shirin; (3) 'Laila and Majnun,' which describes the love of Majnun, a son of the Arabian desert, for the beautiful Laila; (4) 'Haft Paikar' ('Seven Portraits'), a collection of seven novels in a kind of poetical heptameron. The most famous of these tales is the 4th, called Turandocht, which, after being subjected to various changes, furnishes the materials of Gozzi's and Schiller's well-known dramas; (5) 'Iskandar Namah' ('Alexander Book'), a traditional and embellished history of Alexander the Great, taken from the Greek poem on that subject by the pseudo Callisthenes. These five have been assembled in a collection known as 'Panj Ganj' ('The Five Treasures'). Nizami is not so familiar to western nations as Firdausi, Hafiz, or Sa'di; but in Persia he is among the foremost classics, and, in his peculiar field, may be placed second to Firdausi. 'Laila and Majnun' was rendered into English couplet verse by Atkinson (1836).

Nizam's (nĭ-zăm'z) **Dominions.** See HYDERABAD.

Nizhan, nyē'zhän, or **Nyezhin,** nyē'zhēn, Russia, city in the government of Chernigof; on a branch of the Desna which flows into the Dnieper. It is in a fertile agricultural region in which tobacco is one of the principal products. It has a large trade in grain and tobacco. Pop. 33,000.

Nizhni-Novgorod, nēzh'nĭ-nŏv'go-rod. See NIJNI NOVGOROD.

Njord, nyĕrd, in Scandinavian mythology, god of the wind and waves. See MYTHOLOGY.

No Am'mon, or **No,** the Hebrew designation for Thebes, the Disopolis Magnus of the Greeks. It is mentioned in Nah. iii. 8 (*μέρος Ἀμμών*) and in Ezek. xxx. 14—16; Jer. xlvi. 25 (*Διόσπολις*). The shorter form, No, seems to have prevailed generally among the Hebrews, and the Assyrian records call the city Ni, while in Egypt after the 21st dynasty it is written Nt, doubtless pronounced ne-t. Nahum's reference to it as "part of Ammon" makes its identity with Thebes positive. See THEBES.

No-body Crab, or **Sea-spider.** See PANTOPODA.

No Man's Land, a name applied to outlying districts in various countries; at one time to what is now mainly Griqualand East; also to a territory of 80,000 square miles in South Australia; to a small island near Martha's Vineyard, Mass.; to a strip of land bordering on Pennsylvania, Delaware, and Maryland, still in dispute between those States because of the displacement of the early boundary stones. Most commonly, however, the name is applied to Oklahoma in the following connection: In 1845 Texas, on being admitted into the Union, ceded to the United States that strip of her land which lay north of lat. 36° 30′ N. This piece, 167 miles by 35, was without government until 1890, when it became a part of Oklahoma. At one time there was a great rush of prospectors and settlers to this section.

No Name, a novel by Wilkie Collins (q.v.) published in 1862.

Noachian (nō-ā'kĭ-ăn) **Precepts,** seven canons or laws which, according to the Talmud, were given by Jehovah to the sons of Noah. These precepts are analogous to what among the Romans was classed as Natural Law or *Jus Gentium,* a code revealed by the consensus of conduct among the Mediterranean nations. The seven Noachian Precepts enjoin: 1. Submission to civil authorities, kings, judges, etc. 2. Avoidance of idolatry and sacrilege. 3. Reverence to the name of God, as in taking an oath. 4. Proper restraint and direction of the human sexual instinct. 5. Reverence for life, even of animals, by refusing to consume the blood of beasts as food. 6. Respect for the rights of property. 7. Refusal to eat the member of a living animal. The expanding and refining genius of the Rabbins sometimes adds four others to these seven, namely: 1. The blood of a living animal is not to be drawn for the purpose of drinking it. 2. Animals are not to be mutilated. 3. Magic and sorcery are unlawful. 4. The crossing of animals and grafting of trees are also unlawful. No stranger was allowed to dwell in Hebrew territory unless he conformed to the Noachian Precepts and became a "proselyte of the gate"; in contradistinction to the strangers who conformed by being circumcised, and were styled "proselytes of righteousness."

Noack, nō'äk, **August,** German painter: b. Darmstadt 1822. After painting under Sohn, Lessing and Schadow, in the Düsseldorf Academy (1839–42), he continued his student life in Munich and Antwerp, but eventually settled in his native town 1855, where he was made court painter and professor at the Polytechnic. He has painted several fine altar-pieces, and his 'Visit of Landgrave Philip the Magnanimous to Luther' (Rostock Gallery) and 'The Disputation at Marburg' (Darmstadt Gallery) give him high rank as a painter of historical pictures.

Noah, nō'ą, according to the Hebrew Scriptures, the son of Lamech, and 10th in descent from Adam. He was the first ancestor of the new race of men who should people the earth after the flood, in which points he is the counterpart of the Chaldaic Xithuthros, the Hindu Prithu, and the Greek Deucalion, severally. We read nothing of him from his birth till he is 500 years old, when we are told that he begat three sons, Shem, Ham, and Japheth. Having been warned by God of the coming flood, he built an ark or great vessel by the direction of Jehovah, into which he entered with his family and all kinds of animals of every kind. After the waters had subsided the ark rested on Mount Ararat, where Noah offered a burnt-offering to God, and was assured that the earth should never again be destroyed by a flood. This is the first passage in the Bible where altar or burnt-sacrifice is mentioned. As a sign of this covenant with Noah, God set the rainbow in the clouds. Noah died at the age of 950 years, 350 years after the flood. The narrative marks several important points in the history of civilization. In agriculture, the recognition of such seasons as seed time and harvest; and the discovery of the vine, which is made such a salient point in Greek mythology; the institution of sacrificial worship; the institution of civil government. The Noachian Precepts (q.v.) are founded on Genesis ix. 1–17.

Noah, Mordecai Manuel, American politician and journalist: b. Philadelphia 19 July 1785; d. New York 22 March 1851. Through the influence of Robert Morris he was appointed clerk in the auditor's office of the United States Treasury. On the removal of the national capital from Philadelphia to Washington, he resigned his clerkship, and was for a time reporter at the sessions of the Pennsylvania Legislature at Harrisburg. In 1813 he was appointed United States consul at Tunis, with a special mission to Algiers. Captured in the English Channel by an English war ship, on 3 July 1813, he was detained several weeks as a prisoner of war, and then released, next proceeding by way of Spain to his post of duty. He succeeded in ransoming the American prisoners whom the Algerians held in slavery, but was recalled on the pretext that his religion was incompatible with his consular position at Tunis. He was abundantly vindicated later. In those days the United States paid a yearly tribute of $200,000 to Tunis for the privilege of navigating the Mediterranean. Noah denounced such payment, insisting that the money would be better spent in building war ships. Returning home in 1819

and settling in New York city he published a volume of his 'Travels in England, France, Spain and the Barbary States,' and founded the 'National Advocate.' In 1822 he was elected high sheriff of the city and county of New York. After the discontinuance of the 'National Advocate,' he began the 'New York Enquirer' which was merged with the 'Courier' and became the 'Courier and Enquirer,' in partnership with James Watson Webb, but political differences soon dissolved their connection. Appointed by President Jackson surveyor of the port of New York, he established in 1834 the *Evening Star* and became judge of the court of sessions. In 1842 he started a daily, *The Union,* which became a weekly and under the title, 'Noah's Sunday Times and Messenger,' was edited by him until his death. A most interesting project in which he engaged in 1820 was to re-establish the Jewish nation and form a place of refuge for Jewish emigrants on Grand Island, in the Niagara River, near Buffalo. In 1825 with impressive ceremonies, he laid the cornerstone of the proposed city at White Haven, but the new "Ararat," as it was termed, came to naught. Noah's literary activity was varied; it included a large number of addresses and essays, a translation of the 'Book of Yashar,' and many plays, some of them popular in their time. He was ever broad-minded and charitable, and a picturesque figure of his time. Consult: Wolf, 'Mordecai Manuel Noah: A Biographical Sketch' (1897); Morais, 'Eminent Israelites of the 19th Century' (1886).

Noah, Samuel, American soldier: b. London, England, 19 July 1779; d. Mount Pulaski, Logan County, Ill., 10 March 1871. Of Jewish descent and a cousin of M. M. Noah (q.v.), at 20 he emigrated to America, and was appointed 5 May 1805 cadet in the 1st Regiment of Artillery. He was graduated 9 Dec. 1807, was promoted ensign in 2d Regiment and after desultory service in the Gulf States resigned (13 March 1811) his commission of 1st lieutenant in the army. He joined Magee's Mexican forces which were besieged at Fort Bahia (14 Nov. 1812) by the Spanish royalists. On Magee's death, Noah in command of the rear-guard routed the enemy and captured San Antonio. War having been declared by the United States against England, Noah left Texas to re-enter the United States army, but on President Madison's refusal to re-commission him, volunteered as a private soldier to defend Brooklyn and served to the end of the war. At the time of his death he was the oldest graduate from West Point. Consult Cullom, 'Biographical Sketches of Deceased Graduates of the U. S. Military Academy.'

Noah Claypole. See CLAYPOLE, NOAH.

Noah, Book of, a legendary pseudepigraphical book purporting to throw fuller light on the antediluvian and post-diluvian years of Old Testament history. Its date and authorship are equally uncertain.

Noailles, nō-ī, French family from Limousin, dating from the 11th century. Its more important members are as follows: ANTOINE DE NOAILLES, b. 1504; d. Bordeaux 11 March 1562. He was admiral of France, ambassador to England 1553–6, the king's agent in the Truce of Vaucelles, and governor of Bordeaux. His grandson, ANNE JULES DE NOAILLES, b. Paris 1650; d. Versailles 1708; was a servile courtier of the French king, who made him marshal of France in 1693. His son, ADRIEN MAURICE, DUC DE NOAILLES, b. Paris 29 Sept. 1678; d. there 24 June 1766; like his father was marshal of France (1734). Before this he had made his reputation by his financial policy and his opposition to Law. He fought in the war of the Polish Succession, became commander-in-chief of the army in Italy in 1735, and in the war of the Austrian Succession was crushingly defeated at Dettingen. His memoirs were edited by Millot (1777) and his correspondence by Rousset (1865). His son LOUIS, b. Versailles 21 April 1713; d. Paris 22 Aug. 1793; fought in Flanders and Germany; became marshal of France in 1775. LOUIS MARIE, VICOMTE DE NOAILLES, b. Paris 1756; d. Havana 1804; married a sister of Lafayette's wife and with Lafayette urged French intervention, and fought in America in behalf of the American Colonies, in which he took refuge during the darkest days of the Revolution. He returned to France soon afterward, but resigned from the army in 1792, again came to America, and fought bravely in the French army in San Domingo, being killed in the brilliant capture of an English war vessel off Havana. PAUL, a great-grandson of Louis, b. Paris 4 Jan. 1802; d. there 12 May 1885; upheld the Bourbons and wrote 'Histoire de Mme. de Maintenon' (1848–58) and 'Histoire de la Maison de St. Cyr' (1865). His great-grandson, in turn, EMANUEL HENRI, MARQUIS DE NOAILLES, b. 15 Sept. 1830; was French minister to Washington 1872, to the Papal Curia 1873, to Rome 1876–82, to Constantinople 1882–96, and 1896–1902 to Berlin; and wrote on Polish history. His brother JULES CHARLES VICTURNIEN, DUC DE NOAILLES (1826–95), was a well-known economist, one of the editors of the *Revue des Deux Mondes,* and author of many economic and historical studies, notably 'Cent Ans de République aux Etats-Unis' (1886–91).

Nobbe, nō'bĕ, **Friedrich,** German plant physiologist: b. Bremen, Germany, 20 June 1830. He was educated at Jena and Berlin, and in 1861 was called to a professorship at the Industrial School in Chemnitz. In 1868 he joined the faculty at the Academy of Forestry and Agriculture at Tharandt, where he founded an experiment station for plant physiology, and he originated, in 1869, scientific seed testing. He has published: 'Wider den Handel mit Waldgrassamen für die Wiesenkultur' (1876); etc.

Nobel, nō'bĕl, **Alfred Bernard:** b. Stockholm, Sweden, 21 Oct. 1833; d. San Remo, Italy, 10 Dec. 1896. He was the third son of Emmanuel, and in 1842 his father moved with his family to Saint Petersburg, Russia. In 1850 he sent Alfred to the United States to study under the famous engineer John Ericsson. On reaching his 21st year the son returned to Saint Petersburg trained as an engineer and moreover able to speak fluently Swedish, Russian, English, German and French. Later he took up the study of chemistry and showed a marked preference for that science in its technical applications. Emmanuel Nobel went to Russia under contract to prepare mines and torpedoes for the Russian government, and erected on the Neva works for their manufacture which eventually

were extended to include the manufacture of firearms and agricultural implements.

After Alfred returned from America he was constantly engaged with his father in pursuing some invention. Among other substances nitroglycerin especially occupied their attention, and finally in 1862 they had erected a works at Helenborg, Sweden, where nitroglycerin was manufactured on a commercial scale for the first time in its history. In 1864 the works were destroyed by an explosion which killed the chemist, and Alfred's younger brother Oscar, and the calamity so affected Emmanuel Nobel as to bring on a paralytic stroke which left him permanently crippled. Alfred Nobel immediately erected new works on a barge anchored in Lake Mälaren and in 1865 enlisted capital to erect works on a large scale at Winterviken, Sweden, and Krümmel, Germany. So many accidents occurred with nitroglycerin, and especially the destruction of a vessel transporting it at Aspinwall on the Isthmus of Panama attracted such attention, that its transportation was interdicted by many governments. In the latter part of 1866 Nobel discovered dynamite which replaced it and which was at once manufactured in his Swedish and German factories and in 1868 at a factory which he started near San Francisco, Cal. In 1871 he erected at Ardeer, Scotland, the works which are now the largest dynamite works in the world. In fact dynamite met with such acceptance that works sprang up in all civilized countries, and while in 1867 but 11 tons were made, in 1882, 9,500 tons were produced and in 1900 the United States alone manufactured 42,923 tons. In 1875 Nobel invented explosive gelatine and the gelatine dynamites. In 1888 he invented ballistite. Alfred Nobel was interested in many other arts than that of explosives, having taken out in England alone 129 patents. With his brothers Ludwig and Robert he formed in 1878 the famous firm of Nobel Brothers that operated the petroleum wells at Baku, Russia, and has proved the most active competitor of the Standard Oil Company. He also purchased the large ordnance works at Bofors, Sweden, that he might the more readily carry out his inventions in ordnance and his investigations in metallurgy. At his death he left an estate worth over nine millions of dollars, and in his will, after leaving small legacies to his already wealthy relatives, directed that the residue should constitute a fund the interest from which should be divided into five equal amounts and awarded as prizes to the person who shall have made, (1) the most important discovery or invention in the domain of physics; (2) in chemistry; (3) in physiology or medicine; (4) who shall have produced in the field of literature the most distinguished work of an idealistic tendency; and (5) who shall have most or best promoted the fraternity of nations, the abolishment or diminution of standing armies and the formation and increase of peace congresses. Prizes (1) and (2) are awarded by the Royal Academy of Science in Stockholm; (3) by the Caroline Medical-Chirurgical Institute in Stockholm; (4) by the Swedish Academy in Stockholm, and (5) by the Norwegian Storthing (Parliament). The statutes approved by King Oscar of Sweden require among other conditions "that every candidate for a prize . . . be proposed as such in writing by some duly qualified person. A direct application for a prize will not be taken into consideration." "Every written work, to qualify for a prize, shall have appeared in print." "No work shall have a prize awarded to it unless it has been proved by the test of experience or by the examination of experts to possess the pre-eminent excellence that is manifestly signified by the terms of the Will." The announcements of the awards are made on 10 December when the prize is given together with a diploma and gold medal. It is expected that within six months thereafter the prize-winner will lecture upon the subject for which the prize is awarded at Stockholm, or, in the case of the Peace prize, at Christiania.

The will was contested by heirs but a compromise was effected on condition that a portion of the property be devoted to the founding of institutions for research known as Nobel Institutes, which has been done. The income from the residue of the estate permits, however, of five prizes, each approximating closely to $50,000 in value, being awarded annually. Awards were made for the first time 10 Dec. 1901, prizes being given in physics to Wilhelm Conrad Röntgen of Munich, discoverer of the Röntgen rays; in chemistry to Jacob Henry Van't Hoff of Berlin, founder of the science of stereochemistry; in physiology and medicine to Emil von Behring, discoverer of diphtheria serums; in literature to Armand Sully-Prudhomme of Paris, author of 'Justice' (1878) and other poems, and 'De l'expression dans les beaux-arts' (1884) and other prose works. The prize for peace was divided between Henri Dunant of Switzerland, prime-mover of the Geneva Convention and of the Red Cross societies, and Frederic Passy, founder of the Universal Peace Union.

The prizes for 1902 were awarded in physics jointly to H. A. Lorentz and P. Zeeman of Holland for researches on radiant energy; in chemistry to Emil Fischer of Berlin for syntheses of sugars; in physiology and medicine to Donald Ross of Liverpool for the discovery of the dissemination of malaria by the mosquito; in literature to Theodore Mommsen of Berlin for his works on Latin inscriptions and Roman history; and for peace to Frederick de Martens of Russia for promoting the Hague Conference and the Venezuelan Arbitration. The peace prize may be awarded to an institution or association as well as to individuals.

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No'bert's Test-plates, finely-ruled glass plates so named from F. Nobert, a German optician, used for testing the power of microscopes. The rulings are executed on the under surface of a piece of exceedingly thin glass by means of a diamond point. Some of these ruled plates have the almost incredible number of 225,187 spaces to the inch. As means of testing the power of the microscope they are superior to any other object.

Nobil'ity, in European countries, a certain rank or class of society which possesses hereditary honors and privileges above the rest of the citizens. Such a class is found in the infancy of almost every European nation. Its origin may be attributed to military supremacy, to the hon-

ors paid to superior ability, or to the guardians of the plebeians, consisting of those who had Romans the patricians originally formed the nobility; but a new order of nobility arose out of the plebeians, consisting of those who had held curule magistracies and their descendants, enjoying the right of having images of their distinguished ancestors. Among the ancient German tribes only obscure traces of hereditary nobility are found. The dignities of the counts of the Franks, the aldermen and great *thanes* of England, as also of the *jarls* (in England *eorlas*) of Denmark, were accessible to every one distinguished by merit and favored by fortune. In Venice a civic nobility grew up consisting of a series of families who gradually acquired all political power and kept it to themselves and their descendants. In England hereditary nobility, the nobility belonging to the titles of duke, marquis, earl, viscount, and baron, is now entirely personal, though formerly, as a result of the Norman conquest, it was connected with the holding of lands.

In Spain and Italy still the same rank depends in greater measure upon property; and in France and Germany the *de* and *von* of titles points to the same fact. In France and Germany nobility is common to all the members of the noble family, and the German nobility form a very exclusive caste. In France and Germany the nobles long formed a class of petty sovereigns within their own domains. The French Revolution first deprived the nobles of that country of their privileges and exclusive rights, as that of jurisdiction, etc.; and the decree of 19 June 1790 abolished hereditary rank entirely. Under Napoleon I. arose a new hereditary nobility, with the titles of princes, dukes, counts, barons, and chevaliers, which descended to the eldest son. After the restoration of the Bourbons (1814) the ancient nobility reclaimed their former rights and privileges. Nobility was again abolished in 1848, but was restored by Napoleon III. In Norway the parliament abolished nobility by the three successive decrees of 1815, 1818, and 1821.

In Great Britain titles of nobility can only be conferred by the sovereign, and that by patent, in virtue of which they become hereditary. Life peerages also are occasionally conferred. The nobility, as the term is commonly used, consists of those holding the titles already mentioned (or all above the rank of baronet) and their more immediate connections; but if the term were to be used as generally in Europe the gentry would also be included, or all families entitled to bear coat armor. Those of the nobility who are peers of England, of Great Britain, or of the United Kingdom, have a hereditary seat in the House of Lords, while the Scottish peers elect 16 of their number to represent their order, and the Irish peers elect 28 representatives for the same purpose. There is no nobility in America, the Federal Constitution declaring that "No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign state." Congress sparingly gives its consent for a person in the service of the government to accept a decoration or other mark of honor from another government.

Noble, nō'bl, **Alfred,** American civil engineer: b. Livonia, Mich., 7 Aug. 1844. He was graduated from the University of Michigan in 1870, since when he has been engaged in civil engineering. He was a member of the United States board of engineers on deep waterways in 1897–1900 and of the Isthmian Canal Commission in 1899–1903.

Noble, Sir **Andrew,** English physicist: b. Scotland 13 Sept. 1832. He was educated at Edinburgh Academy, and is an authority on army ordnance and explosives. He was assistant inspector of artillery in 1859, and since 1860 has been a member of the firm of Sir W. G. Armstrong, Whitworth & Company. He became high sheriff of Northumberland in 1896.

Noble, Annette Lucile, American author: b. Albion, N. Y., 12 July 1844. She was graduated from Phipps Union Seminary in 1863, and has since devoted herself to literature and traveling. She has published: 'Uncle Jack's Executors' (1880); 'After the Failure' (1887); 'The Crazy Angel' (1901); etc.

Noble, Edmund, American author and journalist: b. Glasgow, Scotland, 8 Jan. 1853. He was educated in Lancashire, and entered journalism in 1872 as reporter on the St. Helen's *Newspaper and Advertiser.* In 1882 he became proprietor of the Liverpool *City News,* and was in Russia as correspondent of the London *Daily News,* and other London journals, in 1882–4. He was a foreign editorial writer of the New York *Herald* in 1887, and edited the American edition of 'Free Russia' 1892–4. He has published 'The Russian Revolt' (1885); 'Russia and the Russians' (1900); 'Before the Dawn' (1901).

Noble, Frederick Alphonso, American Congregational clergyman: b. Baldwin, Maine, 17 March 1832. He was graduated from Yale University in 1858, and from Andover Theological Seminary in 1861. He held various important charges until 1901, when he resigned. He has been prominently connected with the leading missionary conferences of his church, and has written: 'Divine Life in Man' (1896); 'Typical New Testament Conversions' (1901); etc.

Noble, John Willock, American lawyer: b. Lancaster, Ohio, 26 Oct. 1831. He was graduated from Yale University in 1851 and engaged in law practice. He was city attorney of Keokuk, Iowa, at the outbreak of the Civil War, when he enlisted and served through the war, rising to the rank of brevet brigadier-general. In 1867–70 he was United States attorney for Missouri at Saint Louis, and in 1889–93 secretary of the interior in President Harrison's cabinet. He has resumed his law practice in Saint Louis.

Noble, in numismatics, an ancient English gold coin, six shillings and eightpence, or $1.66, first struck in the reign of Edward III., 1344. Half-nobles and quarter-nobles were also in circulation at the same period.

Noblesville, nō'b'lz-vĭl, Ind., city, county-seat of Hamilton County, on the White River, and on the Lake Erie & W. and the Chicago & S. E. R.R.'s; about 18 miles north by east of Indianapolis. It was settled in 1824, and in 1839 was incorporated. It is in an agricultural region and in a natural gas belt. Its chief manufactures are flour, foundry products, and strawboard. It

has grain elevators, enameling and carbon works. There is considerable trade in the manufactured articles and farm products. The charter of 1890 provides for a mayor, who holds office four years, and a council. Pop. (1890) 3,054; (1900) 4,792.

Nobunaga, nō-boo-nä'gä, Japanese general and statesman: b. Owari 1533; d. Kioto 1582. He was son of a soldier and small landholder, and to the little property left him in 1549 by his father rapidly added more, so that in 1559 he had control of the entire province of Owari. Thence, with the assistance of his lieutenant, Hideyoshi, he made bold forays into neighboring provinces. In 1567 he made an alliance with Yoshiaki, younger brother of the lately assassinated shogun, and, having put him upon the throne in 1568, was appointed vice-shogun, in which office he put down all opposition, crushed the political power of Buddhism, and encouraged the Jesuit missions, no doubt merely to countervail the influence of the Buddhists. Yoshiaki, attempting an alliance against Nobunaga, was deposed in 1573, and Nobunaga took the powers but not the titles of the shogunate, thus forwarding the work of political reform. In 1582 one of his lieutenants, angered, says legend, by a practical joke of Nobunaga, turned against him, hemmed him in in a temple in Kioto, and set fire to the building. Nobunaga committed hari-kari. Consult: Dening, 'Life of Hideyoshi' (1890); Brinkley, 'Japan' (1901).

Noctes Ambrosianæ, nŏk'tēz ăm-brō-sĭ-ā'-nē. See Blackwood, William; Wilson, John.

Noctilu'ca, a luminous flagellate protozoan (*Noctiluca miliaris*), extremely abundant throughout all seas, and one of the chief causes of the "phosphorescence" of the waves. It is a spherical animal — large for an infusorian (.02 inch in diameter) — and moves by means of a long stout lash or flagellum, beside which there is a second, very much smaller, lying in the "mouth" region. Its substance is remarkably spongy, and the phosphorescence is said by Allman to have its seat just underneath the tough rind which is its most peculiar characteristic. It represents, with a similar form (*Leptodiscus*), the order *Cystoflagellata.* See Flagellata.

Noctu'idæ. See Moths; Owlet-moths.

Noc'turne, (1) in art, a painting exhibiting some of the characteristic effects of night light. Whistler has produced various nocturnes which have given rise to considerable controversy. (2) In music, the term denotes a composition in which the emotions, particularly those of love and tenderness, are developed. The nocturne was invented by John Field (q.v.), and has become a favorite style of composition with modern pianoforte composers. Chopin is the most famous of nocturne composers. See Chopin; Field, John.

No'dal Lines and Points. See Node; Harmonics.

Nod'dy, a dark brown tern (*Anöus stolidus,*) widely diffused through the northern and southern hemispheres, and well known to sailors for its fearlessness, regarded as stupidity, allowing itself even to be taken by the hand; but this is true only of birds rarely or never disturbed by men. The noddy is a rare visitant to northern shores, but is very abundant in warmer climates, as in the West Indies and South Seas, where its eggs are gathered from certain lonely islets in immense quantities and used as food.

Node, (1) in astronomy, the two points in which the orbit of a planet intersects the plane of the ecliptic; the one through which the planet passes from the south to the north side of the ecliptic being called the ascending node, and the other the descending node. As all the bodies of the solar system, whether planets or comets, move in orbits variously inclined to the ecliptic, the orbit of each possesses two nodes, and a straight line drawn joining these two points is called the line of nodes of each body. It is scarcely necessary to add that as the earth moves in the plane of the ecliptic she has no nodes. The places of the nodes are not fixed points on the plane of the ecliptic, but are in a constant state of fluctuation, sometimes advancing (eastward), and at other times receding (moving westward). This motion is produced by the mutual attractions of the planets, which tend to draw each of them out of the plane of its orbit; and it depends upon the relative positions of the planets with respect to another planet whether that planet's nodes shall advance or recede. (2) In physics, a point in a vibrating body, or system of vibrating particles, where there is no movement. When a body is vibrating, the vibratory motion is conveyed from one place to another by the action of the molecular forces of the particles on one another. If a plate of glass or metal be held in the hand, and a bow be drawn across the edge, particles of fine sand, previously placed on the plate, will arrange themselves in lines, along which it is evident no vibration has taken place. These lines, called nodal lines, generally form geometrical figures. (3) In botany, the joint of a stem, or the part where a leaf or several leaves are inserted.

No'diak, a Papuan animal. See Echidna.

Nodier, Charles, shärl nō-dē-ā, French author: b. Besançon, France, 29 April 1780; d. Paris 27 Sept. 1844. At an early age he proceeded to Strasburg, where he studied under Eulogius Schneider, and, returning to his native district, gave much of his attention to natural history. In 1798 he became assistant librarian at Besançon. Soon drawn into connection with royalist clubs, he wrote with great acrimony against Bonaparte. These philippics subjected him to prosecutions, and even to imprisonment. For several years he lived concealed in the Jura, and then fled to Switzerland, where he supported himself as a corrector of the press until, after many adventures, he returned to France. In 1814 he went to Paris, where Louis XVIII. rewarded him with a title of nobility and the cross of the Legion of Honor. In 1824 he was appointed librarian to the arsenal, and in 1834 admitted a member of the Academy. As a critic he is known by a series of excellent editions of the French classics with notes. As a grammarian and lexicographer he published: 'Dictionnaire des Onomatopées de la Langue française'; 'Examen critique des Dictionnaires de la Langue française'; 'Dictionnaire universel de la Langue française'; and 'Elements de Linguistique.' Among his many other works, many of them fictions of the romantic school, are: 'Stella ou les proscrits' (1802); 'Trilby ou le Latin d'Argail' (1822).

Nod'ular Disease. See Sheep, Diseases of.

Noé, Amédée de, ä-mā-dā dė nō-ā. See CHAM.

Noel, nō'ĕl, **Baptist Wriothesley,** English clergyman: b. Leightmont, Scotland, 10 July 1799; d. Stanmore, Middlesex, 20 Jan. 1873. A brother of the first earl of Gainsborough, he was graduated from Cambridge University in 1826, entered the Anglican ministry and was incumbent of Saint John's, Bedford Row, London. In 1848 he quitted the Establishment for the Baptist fold, became widely known as a Baptist minister in London, and was prominent in philanthropic labors in the metropolis. He published 'Essay on Christian Baptism' (1849); 'The Union of Church and State' (1848); 'Freedom and Slavery in the United States of America' (1863); 'Hymns About Jesus' (1869); etc.

Noel, Roden Berkeley Wriothesley, English poet: b. England 1834; d. Mainz, Germany, 26 May 1894. He was a son of the Earl of Gainsborough. He was educated at Cambridge, and though never a popular poet his work appeals to highly educated readers and is much of it rich in melody, though too voluminous to keep entirely to his best standard. His published volumes include 'Behind the Veil and Other Poems' (1863); 'A Little Child's Monument' (1881); 'A Modern Faust and Other Poems' (1888); etc.

Noel, Thomas, English poet: b. Kirkby-Mallory, England, 11 May 1799; d. Brighton, England, 16 May 1861. He was graduated from Merton College, Oxford, 1824 and was the author of the famous poem 'The Pauper's Drive,' often credited to Hood. Among his other works are: 'The Cottage Muse' (1833); 'Rhymes and Roundelays' (1841).

No'emi, a romance by Sabine Baring-Gould, published in 1895. It is a tale of Aquitaine, during the English occupation, in the early 15th century.

Noetians, nō-ē'shĭ ạnz. See PATRIPASSIANS.

Noet'ic Consciousness. See METAPHYSICS.

Nogales, nō-gä'lĕs, Mexico, town in the state of Sonora; on the Santa Cruz River, on the boundary between Mexico and Arizona, and on the Sonora Railroad. A United States consul is stationed here. Pop. (1901) 2,738.

Nogaret, Stanislas Henri Lucien de, stän-ēs-läs ōn-rē lü-sē-ōn dė nō-gä-rā, French colonist in America: b. Marseilles 1682; d. Paris 1759. He studied law; ran away from college; served in the army in Canada until 1716; and then was sent to Louisiana where he became Bienville's lieutenant in the bloody wars with the Natchez Indians described by Nogaret in his 'Précis des Etablissements fondés dans la Vallée du Mississippi par le Chevalier Le Moyne de Bienville' (1738). From 1735 until his death Nogaret resided in France and acted as director of the Louisiana Company.

Noiré, nwä-rā, **Ludwig,** German philosophical writer: b. Alzey, Hesse, Germany, 26 March 1829; d. Mayence, Germany, 26 March 1889. He was educated in Giessen and taught for many years in the gymnasium at Mayence, giving himself meantime to philosophical study. He wrote: 'Die Welt als Entwicklung des Geistes' (1874); 'Einleitung und Begründung einer monistischen Erkenntnisstheorie' (1877); 'Logos' (1885).

Noiseless Powder. See EXPLOSIVES.

Noisseville, nwäs-vēl, France, a village five miles east of Metz, celebrated as the scene of Bazaine's attempt to break through the line of German besiegers 31 Aug.–1 Sept. 1870. With 120,000 men and 600 guns, he attacked Manteuffel with 41,000 men and 138 guns, drove him back and took the villages of Montoy, Servigny, and Courcy, but German reinforcements arriving on the second day, Bazaine was compelled to fall back upon Metz.

Nola, nō'lä, Italy, city in the province of Caserta; 16 miles east by north of Naples. It is said to have been founded by the Etrurians before Rome was built, and 313 B.C. it became a part of the Roman territory. It successfully resisted an attack of Hannibal in the Second Punic war. Nola claims to have made, in the 5th century, the first bells used in Christian churches. Giordano Bruno (q.v.) was born in Nola and Augustus died here in 14 A.D. Pop. (1901) 14,622.

Nöldeke, nėl'dė-kĕ, **Theodor,** German orientalist: b. Harburg, Germany, 2 March 1836. He was educated at the gymnasium of Lingen, Hanover, and at the University of Göttingen. In 1859 he won the prize offered by the French Académie des Inscriptions with his history of the Koran, which he wrote in French and translated into German in the following year. He was privat-docent at Göttingen in 1861–4 and then was appointed assistant professor there. In 1860–72 he occupied the chair of theology at Kiel and was then called to the professorship of Oriental languages at Strasburg. A scholar of wide attainments he has made a specialty of the Semitic languages and of Oriental philology and history, in which departments he is a leading authority. He is a voluminous writer and much of his work is intended for specialists only, yet much of his writing is intended for the general public and he has contributed to several encyclopædias. He has published: 'Über die Mundart der Mandäer' (1862); 'Die Gedichte des Urwa ibn Alward' (1863); 'Das Leben Muhammeds' (1863); 'Die Alttestamentliche Litteratur' (1864); 'Grammatik der Neusyrischen Sprache' (1868); 'Untersuchungen zur Kritik des Alten Testaments' (1869); 'Mandäische Grammatik' (1874); 'Aufsätze zur persischen Geschichte' (1887); 'Orientalische Skizzen' (1892), translated into English in that year and revised by him; etc.

Nolhac, Pierre de, pē-ār dė nōl-āk, French historian: b. Ambert 15 Dec. 1859. He studied at the French school in Rome, worked for a year in the Bibliothèque Nationale, in 1886 became professor of history and classical philology in the Ecole des Hautes Etudes, and in 1892 was appointed conservator of the Versailles Museum. Among his literary and historical studies are: 'Lettres de Joachim du Bellay' (1884); 'La Bibliothèque de Fulvio Orsini' (1887); 'Erasme en Italie' (1888); 'Marie Antoinette' (1890); 'Petrarque et Humanisme' (1892); 'Histoire du Château de Versailles' (1899–1900); and 'Louis XV. et Marie Leczinska' (1901).

Noll, nŏl, a name by which Oliver Cromwell (q.v.) was popularly known.

Nolle Prosequi, nŏl'ĕ prŏs'ĕ-kwī (to be unwilling to prosecute) in law, is a stoppage of proceedings by a plaintiff, and is an acknowledgment that he has no cause of action. It is

resorted to for the most part when the plaintiff has misconceived the nature of the action, or the party to be sued. In the United States the government — Federal, State or Municipal — through its attorney often enters a *nolle prosequi*, especially where there exists a lack of evidence for the prosecution.

Nollekens, nŏl'ĕ-kĕnz, **Joseph,** English sculptor: b. London 11 Aug. 1737; d. there 23 April 1823. He was the son of a painter of Antwerp, who had settled in England and after studying sculpture at Rome became very successful in the execution of portrait busts. He modeled busts of George III., Pitt, Canning, and Castlereagh. His finest ideal statue is 'Venus with the Sandal.'

No'ma. See CANCRUM ORIS.

Nom'ads, a general name given roaming or wandering people or tribes without fixed habitations. Nomadic tribes are seldom found to quit their wandering life until they are compelled to do so by being surrounded by tribes in settled habitations, or unless they can make themselves masters of the settlements of a civilized nation. But this change commonly takes place by degrees. Some of the greatest revolutions in history have been effected by these wandering tribes. North Africa, the interior of South America, and the northern and middle parts of Asia, are still inhabited by nomadic tribes. Different tribes, however, possess different degrees of civilization. Some are little better than bands of robbers.

No'marchy, or **Nome,** the largest political division of Greece; a subdivision of a nomarchy is an eparchy, and a subdivision of an eparchy is a demarchy. There are 26 nomarchies in Greece. The government appoints the nomarch who rules or governs a nomarchy. The time which he holds office is indefinite, but the members of the council, who assist him, are elected by the people for a certain definite time.

Nombre de Dios, nōm'brā dā dē'os, Mexico, city in the state of Durango; about 150 miles from the Gulf of California, and 30 miles southeast of Durango, the nearest railroad station. It is situated in a region noted for its extensive deposit of silver ore. Pop. 10,826.

Nome, nōm, Alaska, city in the western part; on the north shore of Norton Sound (q.v.) at the mouth of Snake River; 14 miles west of Cape Nome. It is the commercial centre of an extensive gold mining district in the western part of the Territory, including a large part if not all of Seward Peninsula, as the gold mining district which contributes to the wealth of Nome increases in extent as new fields are prospected. The placer gold fields, so dependent upon water for their development, are not continuous; rich deposits may have long intervening stretches where as yet no gold has been found. Nome came into existence as a mining camp in 1898–9 when gold was discovered in the creeks and streams of the vicinity, and the value of the beach deposits was recognized. Angelo Heilprin, president of the Philadelphia Geographical Society, is authority for the statement that out of the Nome sands "in barely more than two months" has been taken over $1,000,000 by the crude method of "rocking." Nome is the shipping point for Council City, second in size to Nome. The tin found in the vicinity of Cape Prince of Wales, and at Cape York, 90 miles northwest of Nome, is of industrial interest to Nome. Short narrow gauge railroads connect several of the mining camps with the city. The gold output for 1901 was about $7,000,000. The harbor is closed by ice the greater part of the year, so that the city is active only from June to October. The city government is well organized, with all the departments essential for proper maintenance and operation. The streets are lighted by electricity; it has a good water system, free mail delivery, and many of the modern conveniences found in cities in older settlements of the United States. The population in summer is much larger than in winter. Pop. (1900) 12,488. See ALASKA, RECENT DEVELOPMENT OF.

Nome, Cape. See CAPE NOME.

Nome, (1) in music (especially in ancient Greek) any melody which was made up from or depended on natural or inviolable rules. (2) A province or other political division of a country, especially ancient Egypt and modern Greece. See NOMARCHY.

Nom'inalism, in the Middle Ages, a name of one of two rival schools of philosophy dating from the time of Plato. The discussion arose respecting the nature of our general or abstract ideas, or of "universals." It was contended by some that abstractions — as a circle in the abstract, beauty, right — had a real existence apart from round things, beautiful objects, right actions. This was called realism. Those who held the opposite view were called Nominalists, because they maintained that there is nothing general but *names*; the name "circle" is applied to everything that is round, and is a general name; but no independent fact or property exists corresponding to the name. Specifically the controversy was as to the existence of "universals" or of genera and species, and arose out of a passage in the Latin translation of Porphyry's 'Isagoge.' Roscellinus, canon of Compiègne, in the latter part of the 11th century, was the first advocate of nominalism, and maintained, in opposition to the advocates of realism, that general ideas have no separate entity. He was charged with holding heretical opinions concerning the Trinity, for which he was cited before the Council of Soissons, and condemned 1092 A.D. His first great opponent was Anselm, Archbishop of Canterbury, and later Abelard, who had been a pupil of Roscellinus, modified his master's views into what is known as conceptualism.

Nomina'tion. See CAUCUS.

Nomoc'anon, in the Greek Church, a systematic collection of ecclesiastical laws, including certain secular enactments, especially imperial decrees, which have an ecclesiastical bearing. The most important is the Nomocanon of Photius (883) which was republished at Rome 1842 in the 'Spicilegium Romanum.'

Non-activity. See NEUTRALITY.

Non-com'batants, a term used in warfare for officers and privates charged with administrative duties and who do not fight unless in self-defense.

Non-commissioned Officers, in the army are officers intermediate in rank between the commissioned officers and privates or marines.

They are selected from among the latter, and are generally the most meritorious of these. They vary in rank, and comprise sergeants-major, sergeants, drum-majors, corporals. Their duties are various, but in general it may be stated that they overlook the men when off parade and while in barracks. They can only be reduced to the ranks by the colonel-commandant or by court-martial. A grade of officers above non-commissioned officers are the warrant officers. See ARMY OF THE UNITED STATES.

Non Compos Mentis, nŏn kŏm'pŏs mĕn'tĭs ("not of sound mind") an expression used of a person who is not of sound understanding. See INSANITY.

Non-Euclidean Geometry. See GEOMETRY.

Non-intru'sionists, those members of the Scotch Established Church who contended for the principle that no minister should be intruded on a parish contrary to the will of the congregation. The name originated in a resolution, bearing this import, proposed by Dr. Chalmers and seconded by Lord Moncrief in the General Assembly of 1833. It was to meet these views that the General Assembly, in 1834, passed the Veto Act, which brought the Church into conflict with the law courts, and produced the disruption from which the Free Church of Scotland came into being.

Non Pos'sumus, an expression said to have been used by Pope Clement VII. in reply to Henry VIII.'s demand for the dissolution of his marriage with Catharine of Aragon; used in general expression for the refusal of the Roman Catholic Church to yield to the demands of the temporal power.

Non-resistance, Doctrine of, is, that it is unlawful, on religious grounds, to resist the commands of a ruler or magistrate. The New Testament writers urge the necessity of obedience to those in authority, although, as usually understood, this teaching refers only to lawful commands. It has, however, been maintained that obedience is to be rendered to all the commands of a ruler without exception. The doctrine is closely connected with — may indeed be said to proceed from — the doctrine of the divine right of kings. Hobbes maintained the absolute supremacy of kings, and their right to exact unquestioning obedience from their subjects. This view was the outcome of his social contract theory. In modern times the doctrine has become completely exploded.

No'nane, or **En'nane,** the ninth member of the series of the saturated fatty hydrocarbons, or paraffins. It has the chemical formula C_9H_{20}, and is theoretically capable of existing in no less than 35 different isomeric forms, a number of which have been actually identified. Two of these, having a common specific gravity of about 0.742, and boiling at 266° F. and 277° F., respectively, are known to exist in ordinary petroleum.

Non-confor'mists, those who refuse to join the Established Church in England as by law established. The first Act of Uniformity was passed under Edward VI. 1549. But the term was particularly applied to these clergymen who were ejected from their livings by the Act of Uniformity passed under Charles II. in 1662. Their number was about 2,000. The act required that every clergyman should be ordained by a bishop; should assent to everything in the Book of Common Prayer; take the oath of canonical obedience; abjure the Solemn League and Covenant; and swear allegiance to the king. The Presbyterians, Independents, etc., refused to conform, and were exposed to persecution. By the Five Mile Act (1665) no dissenting teacher who would not conform, could approach within 5 miles of any corporation, or of any place where he had preached after the act of obligion; and should thus be deprived of all means of subsistence. The term was subsequently widened so as to comprehend not only the pastors but their flocks. On the accession of William III. all was changed by the Toleration Act. Some of those oppressive provisions were revived during the reign of Queen Anne, but were finally repealed in 1718. The name *Non-conformists* was under these altered circumstances changed to that of *Dissenters.* The repeal of the Corporation and Test Acts in 1828 removed the civil disabilities under which Dissenters had previously been placed; and other grievances in regard to marriage, church rates, burials in parish churchyards, and university tests were subsequently redressed. See PURITANS; DISSENTERS.

Nones, nōnz, in the Roman calendar, the fifth day of the months January, February, April, June, August, September, November, and December, and the seventh day of March, May, July, and October. The *nones* were so called as falling on the *ninth* day before the ides, both days included. See CALENDAR.

Nonius, Marcellus, Latin grammarian: b. Thubursicum in Numidia at the opening of the 4th century A.D. His 'De Compendiosa Doctrina,' originally consisting of 20 books, is greatly esteemed on account of its many quotations from earlier writers whose works are lost. The 16th book is no longer extant. Consult editions by Quicherat (1871) and L. Müller (1888); also Nettleship, 'Essays in Latin Literature' (1885).

Nonius. See VERNIER.

Nonju'rors, in British history, those who refused to take the oath of allegiance to the government and crown of England at the Revolution, when James II. abandoned the throne. The nonjurors numbered upward of 400 clergy, including one archbishop and eight bishops.

Nonnus, nŏn'ŭs, Greek poet of the 5th century of our era. He wrote the 'Dionysiaca,' an epic poem in 48 books relating the journeys and expeditions of Dionysus in lively and poetic style, full of taste and learning. He was a Christian and produced a poetic paraphrase of St. John's Gospel. Consult: Ludwich, 'Beiträge zur Kritik des Nonnos' (1873).

Nonpareil', a small and beautiful finch (*Cyanospiza ciris*) of the South Atlantic and Gulf States. It is nearly related to the indigo-bird (q.v.), and is frequently kept as a cage-bird, especially by the French people of southern Louisiana, who call it *le pape* (the pope). It is about the size of a canary, and, in the male, ultramarine blue over the whole head and neck, excepting a narrow stripe from the chin to the breast, which, with the under parts generally and the rump, is vermilion red; there are touches of green about the shoulders. The female is clear dark green above and yellowish on

the lower surfaces. Its song is a series of melodious warblings, and its nest is placed in bushes and low trees, and contains pearly white eggs marked with purplish and reddish brown.

Nonsense, Fort, in American history, the name of a former fort near Morristown, N. J., projected by Washington to keep his discouraged and famished army from revolting during the winter of 1779–80. The Washington Association of New Jersey erected a memorial stone on the site of the earthworks in 1888.

Non'suit, in law. See NOLLE PROSEQUI.

Non'yl, or En'nyl, in chemistry, the organic radical C_9H_{19}, whose hydride is the paraffin nonane (q.v.). Nonyl is analogous in its chemical behavior to ethyl and methyl, and, like these, it cannot exist in the free state. The derivatives of nonyl have been very little studied as yet, because they are of no commercial importance, and their relations are exceedingly complicated, owing to the large number of possible isomeric forms that each of them can have. Several of its alcohols, amines and chlorides have been prepared, however.

Non'ylene, or En'nylene, the ninth member of the olefine series of fatty hydrocarbons. It has the chemical formula C_9H_{18}, and is capable of existing in many isomeric modifications. All of these modifications that are known are liquid. One of them, which may be prepared from one of the nonyl chlorides (see NONYL), has a specific gravity of 0.853, and boils at 275° F. Another, which occurs in the distillates from bituminous shales, has a specific gravity of 0.753 and boils at 250° F. A third, which occurs among the products obtained by distilling amyl alcohol with zinc chloride, boils at 284° F.

Nootka (noot'ka) **Indians,** a name given to several North American Indian tribes of the Wakashan family, residing on Vancouver Island. In 1792 they were called Wakash Indians. About 2,500 of them remain, over half of whom are nominally Christians.

Nootka Sound, Canada, an indentation on the west coast of Vancouver's Island. See VANCOUVER'S ISLAND.

Nor'bert, Saint. See PREMONSTRATENSIANS.

Norchia, nôr'chę-a, **The Biga of,** in archæology, a name given to the remains of a biga, or two-horse chariot, discovered in 1901 in the course of some excavations undertaken by a country builder at Norchia, a small town almost 30 miles north of Rome, in what was once a populous part of Etruria. With it were found a number of bronze vessels and some pieces of pottery, of a character familiar among Etruscan remains. These remains were purchased by the Metropolitan Museum of Art in New York, and placed on exhibition. To set the fragments up it was necessary to reconstruct the original chariot. The wheels alone retained their shape. This entailed a work of great delicacy and difficulty, which was accomplished with great skill.

Nor'cross, Frank W., American trade journalist: b. Bangor, Maine, about 1831; d. Philadelphia 21 March 1903. He removed to New York in 1857, and there founded with J. D. Dexter 'The Shoe and Leather Reporter,' the earliest trade journal, but one, in the country. He published: 'The History of the New York Swamp'; 'A Hundred Years' History of the Shoe and Leather Trade in America' (1903).

Nord, nôr, France, a northeastern frontier department bordering on Belgium and the North Sea; area, 2,229 square miles. Capital, Lille. The coast, marked by a long chain of sandy hillocks, furnishes the two harbors of Dunkirk and Gravelines. The interior is a monotonous but fertile alluvial flat, intersected by sluggish streams and canals. The department is essentially agricultural, upward of four fifths of the area being under cultivation. The principal mineral is coal. The iron mines are also very productive. Pop. (1901) 1,877,647.

Nordau, nôr'dow, **Max Simon,** German physician and author: b. Budapest, Hungary, 29 July 1849. He studied at the University of Budapest, receiving his degree in 1872; he then traveled for six years, visiting the principal countries of Europe, and in 1878 began the practice of medicine in Budapest. In 1880 he went to Paris, and after two years of study resumed the practice of his profession there. He began his literary career at Budapest before entering the University as contributor and dramatic critic for 'Der Zwischenact'; he subsequently was an editorial writer and correspondent for several other newspapers. His newspaper writings were collected and furnished the material for his earlier books, including 'Pariser Studien und Bilder' (1878); 'Seifenblasen' (1879); 'Vom Kreml zur Alhambra' (1880); 'Paris unter der dritten Republik' (1881), which are mostly criticisms of political and social conditions. In 1883 he published 'Die konventionellen Lügen der Kulturmenschheit' (English translation, 'Conventional Lies of Society'), in which he shows what he believes to be the essential falsity of some of the social, ethical, and religious standards of modern civilization; and in 1892 published 'Entartung,' translated into English under the title 'Degeneration.' This is his best known work and provoked much criticism; in it he maintains that the civilization of the present, the new inventions, and the growth of great cities have resulted in the degeneration of man, especially of the higher classes; that this degeneration is seen particularly in the lowered, and often depraved, standard of literature, art, and music; and that the authors and artists of the day whose work is in accordance with thes standards, are themselves mental and moral degenerates. His other works include: 'Paradoxe' (1885; in English, 'Paradoxes'); 'Die Krankheit des Jahrhunderts' (1887; in English, 'The Malady of the Century'); 'Seelen Analysen' (1892); 'Die Drohnenschlacht' (1897); the novel, 'Gefühlskomödie' (1891; in English, 'A Comedy of Sentiment'); and the dramas, 'Der Krieg der Millionen' (1832); 'Das Recht zu lieben' (1893); 'Die Kugel' (1894); and 'Dr. Kuhn' (1898). Dr. Nordau is a Jew and has been one of the prominent leaders of the Zionist movement. An attempt to assassinate him was made in the latter part of 1903.

Nordenfelt, nôr'dĕn-fĕlt, **Torsten Vilhelm,** Swedish inventor: b. 1842. He received a thorough technical training; from 1862 to 1866 was engaged in promoting the sale of Swedish iron in London; and early in the eighties established in Sweden, England, and France factories for the production of ammunition, machine guns, torpedoes, and submarine torpedo boats. Soon after-

ward with Hiram S. Maxim (q.v.) he formed the Maxim-Nordenfelt Company. Oscar II. of Sweden named him royal chamberlain in 1885. Nordenfelt's best known invention is a machine gun, intended as a defense against torpedo boats, made with from 2 to 12 barrels, from any one of which the supply of ammunition can be shut off without interfering with the other barrels.

Nordenfelt Machine Gun. See ORDNANCE.

Nordenskiöld, nôr'dĕn-shĕld, **Adolf Erik,** BARON, Swedish Arctic explorer: b. Helsingfors 18 Nov. 1832; d. Dalbyo, Sweden, 12 Aug. 1901. He was educated in Finland at the University of Helsingfors by his father, Nils Gustav Nordenskiöld (1792–1865), a mineralogist, with whom he explored parts of the Urals. He was graduated in 1857, and in 1858 became superintendent of the mineralogical department of the Swedish Royal Museum in Stockholm, having been forced to leave Finland by the Russian authorities, who took umbrage at his political views. In all subsequent Arctic expeditions sent out by the Swedish government he took part, accompanying Torrell in 1858 and 1861, and being leader himself in 1864 and in 1868, when he attained to 81° 42′, the farthest north at that time reached on board ship. Oscar Dickson, a wealthy gentleman of Göteborg, who had contributed to previous exploration funds, made it possible for Nordenskiöld to explore Greenland in 1870, a preliminary expedition, which, however, made important discoveries of algæ and meteorites and penetrated the island farther than had ever been done before. In 1872, after serving two years in the Swedish lower house of parliament, where he allied himself with the Liberal party, Nordenskiöld set out on the fifth Swedish expedition, which wintered in Mossel Bay, whence with a few comrades he pushed north in the spring of 1873 on sledges. In 1875 and 1876 he led the expeditions sent out by Dickson across the Kara Sea and up the Yenesei River, a journey repeated in 1876. These were mere preparations for his great exploit in 1878–9, when he circumnavigated the Eurasian continent; leaving Karlskrona 22 June 1878; wintering in the ice near Bering Strait, after a successful northeast passage, thus accomplishing a project planned three centuries before; reaching Yokohama 2 Sept. 1879, and returning to Europe by the Suez Canal. In 1883 he again explored Greenland from the west coast, beating his previous record of the farthest inland. The remaining years of his life were spent in the study of early cartography, his publications in this field being 'Periplus, an Essay on the Early History of Charts and Sailing Directions' (1897); an edition of Marco Polo, in French with facsimile (1882); 'Bidrag til Nordens äldsta historia' (1892), in honor of the American Columbian celebration, and accompanied by the earliest maps of North America. Most of his important explorations were also described by his pen. Consult: Leslie, 'Arctic Voyages of Nordenskjöld' (1880); and the 'Life,' in Swedish, by Andersson (1901).

Nordenskiöld, Gustav, Swedish explorer, son of A. E. Nordenskiöld (q.v.): b. Stockholm 1868; d. Mörsill 6 June 1895. He explored Spitzbergen in 1890 and the Colorado cañons in 1891, and described the latter in a work translated by Morgan under the title 'The Cliff Dwellers of the Mesa Verde' (1893).

Nordenskiöld, Nils Otto, Swedish explorer and geologist, nephew of A. E. Nordenskiöld (q.v.): b. Smaland 6 Dec. 1869. He was educated at Upsala, where he was graduated with a doctor's degree in 1894. In 1895–7 he accompanied the scientific expedition to Patagonia under Ohlin; in 1898 traveled through the Klondike; in 1900 was a member of the Danish expedition under Amdrup to the eastern coast of Greenland; and in October 1901 left Göteborg on the Antarctic to explore the south polar regions. His ship was sunk in Erebus and Terror Gulf in the early part of 1902, and he and his men encamped on Paulet Island, whence they were rescued by the Uruguay, a gunboat sent out by the government of Argentina.

Norderney, nôr'dĕr-nī, Germany, one of the East Friesian Islands, three miles from the coast of Germany and belonging to the province of Hanover. It is about eight miles long and a little over one mile wide. It is treeless, covered with dunes which are from 10 to 75 feet in height. At the southwest extremity is a village which is protected from the sea by a wall, and the lighthouse in the centre of the island may be seen many miles. The island is the most important of the group on account of being a favorite sea-bathing place. Pop., permanent, about 3,878.

Nordhausen, nôrd'how-zĕn, Germany, city in the province of Saxony, on the Zorge, 40 miles north-northwest of Erfurt. It is at the base of the Harz Mountains and the west end of the fertile "Goldene Aue," that is, "golden plain." It has 70 large distilleries of corn brandy, "Nordhäuser schnaps," tanneries, chemical works, and tobacco factories. A quaint town-hall, a Gothic cathedral, and the Church of Saint Blasius, which has two paintings by Lucas Carnach, are all of interest. Pop. (1901) 29,100.

Nordheimer, nôrd'hīm-ẽr, **Isaac,** American Orientalist: b. Memelsdorf, Germany, 1809; d. New York 31 Nov. 1842. His fondness for learning was early displayed and his maturer education was at Würzburg and Munich, where he gained his degree in 1834. In 1835 he came to New York and was instructor in sacred literature in Union Seminary (1838–42), and professor of Hebrew at the New York University (1836–42). His 'Hebrew Grammar,' an elaborate work in two volumes, appeared in its 2d edition in 1842. His other works include: 'A Grammatical Analysis of Scripture or a Chrestomathy' (1838); 'A Philosophy of Ecclesiastes' (Biblical Repository July 1838). He left in MSS. valuable grammars of Syriac and Arabic.

Nordhoff, nôrd'hŏf, **Charles,** American journalist and author: b. Erwitte, Westphalia, Prussia, 31 Aug. 1830; d. San Francisco, Cal., 15 July 1901. He came to the United States with his parents in 1835, and in 1843 was apprenticed to a printer in Cincinnati. In 1844 he joined the United States navy and served three years, in which time he made a voyage round the world. He continued to go to sea in merchant, whaling, and fishing vessels until 1853, and was then employed in newspaper offices, first at Philadelphia, and later at Indianapolis. From 1857 to 1861 he was engaged in editorial work in a New York publishing house; and from 1861–71 was on the staff of the New York *Evening Post;*

and also contributed to the New York *Tribune*. From 1871 to 1873 he traveled in California and Hawaii, and in 1874 became Washington correspondent for the New York *Herald*. He has described his experiences as a sailor in his 'Man-of-War Life' (1855); 'The Merchant Vessel' (1855); 'Whaling and Fishing' (1856); and 'Nine Years a Sailor' (1857). His sociological and political writings include: 'Secession is Rebellion' (1860); 'The Freedmen of the South Carolina Sea Islands' (1863); 'America for the Free Working Men' (1865); 'Politics for Young Americans' (1875); and 'The Communistic Societies of the United States'; this last is a description and history of different communistic colonies, and is a valuable contribution to descriptive sociology. His other works are: 'Stories from the Island World' (1857); 'Cape Cod and All Along Shore' (1868); 'California for Health, Pleasure, and Residence' (1872); 'Northern California, Oregon, and the Sandwich Islands' (1874); 'The Cotton States in the Spring and Summer of 1875' (1876); 'God and the Future Life' (1881); and 'Peninsular California' (1888).

Nordica, nôr'dĭ-ka, **Lillian,** American opera singer: b. (LILLIAN NORTON) Farmington, Maine, 1859. She studied in the Boston Conservatory and under O'Neill made her first appearance in 1876 as a concert artist, in 1878 went to Europe with Gilmore's Band, studied at Milan under Sangiovanni, and made her operatic début at Brescia in 'Traviata.' Her success was great; she was immediately engaged for the Imperial opera at Saint Petersburg, and after two years there appeared in Paris in 1882. In the same year she retired from the stage to marry Frederick A. Gower, whom she sued for divorce in 1885, but who disappeared at about the time of the suit, probably having been killed in a balloon accident. She first appeared in London in 1887, and in New York in 1895. In 1894 she played Elsa in 'Lohengrin' at the Wagner Theatre in Baireuth, and in 1896 married the Hungarian tenor, Döme, who took the title role in 'Parsifal' at Baireuth in 1894. She obtained a divorce from him in 1904. Her repertoire is large and she is especially successful in Wagnerian opera and in 'Les Huguenots' as Aïda.

Nördlingen, nêrd'lĭng-ĕn, Germany, town in the western part of Bavaria; on the Eger River, 75 miles northwest of Munich. Its history dates back to the year 900, and some of the buildings still remaining bear evidence of an even earlier date. Two of the decisive battles of the Thirty Years' war were fought in Nördlingen; one 16 Sept. 1634, where Ferdinand, the king of the Romans, was successful, and South Germany was freed from foreign rule; and the other 13 Aug. 1645 between the Imperial forces and the French,—the French were victorious. Nördlingen has considerable manufacturing interests; linen and woolen goods, carpets, leather, agricultural implements, furniture, and toys are among the manufactures. It has schools of note and a large library. Pop. (1902) 10,568.

Nordmann, Johannes Rumpelmaier, yō-hän'nĕs room'pĕl-mī-ĕr nôrt'män, Austrian writer: b. Landersdorf, Austria, 13 March 1820; d. Vienna, Austria, 20 Aug. 1887. He was an actor in early life, but after the success of his first book 'Aurelie,' a volume of poems published in 1847, he devoted himself to travel and literature. He wrote: 'Zwei Frauen' (1850); 'Ein Wiener Bürger' (1860); Frühlingsnächte in Salamanca' (1880); etc.

Nordstrand, nôrd'strănt, Germany, an island belonging to the North Friesian group, in the North Sea; area, about 21 square miles. Prior to 1634 the area was about 210 square miles; but that year a flood swept over the island, destroying the greater part of the land and drowning over 6,000 people. Many people on the islands of the vicinity were drowned. Pop. about 3,000.

Nore, nōr, a river in Ireland which has its rise in the mountains in the northeastern part of Tipperary, flows northeast into Queens County, then southeast through Kilkenny, and joins the Barrow River about two miles above New Ross. It is navigable for steamers of considerable size as far as Inistoge about 20 miles from Waterford Harbor, and smaller craft to Thomastown. Kilkenny is the largest city on its banks.

Norfolk, nôr'fŏk, **Charles Howard,** 11TH DUKE OF, English politician: b. 5 March 1746; d. London 1815. Breaking with the traditions of his family, notably his father, a Roman Catholic and author of pamphlets on penal laws against the Catholics, the son became a Protestant and a Whig; sat in Parliament 1780–4; became lord of the treasury in the Portland Cabinet in 1783; and was dismissed in 1798 from the lord-lieutenancy of the West Riding for toasting the "sovereign English people" in terms displeasing to the Crown. At his death the title passed to Bernard Edward Howard, the first Roman Catholic lord to sit in the House after the Act of Emancipation.

Norfolk, Henry Granville Fitzalan Howard, 14TH DUKE OF, English politician: b. 7 Nov. 1815; d. Arundel Castle, Sussex, 25 Nov. 1860. He studied at Trinity College, Cambridge; became a zealous Whig and was always an ardent Catholic. He was a member of the House of Commons from 1837 to 1852, then breaking with his party on the Ecclesiastical Bill of 1850; spent several years in Paris, where he was known as a friend of Montalembert; and in 1856, upon his father's death, entered the House of Lords, where he vigorously opposed Palmerston. He wrote various pamphlets on the Catholic question and the 'Lives of Philip Howard, Earl of Arundel, and of Anne Dacres, His Wife' (1857).

Norfolk, Henry Howard, 6TH DUKE OF, English nobleman, friend of Evelyn, the diarist: b. 12 July 1628; d. Arundel, Sussex, 11 Jan. 1684. He was a younger son of the 2d Earl of Arundel, lived abroad until the Restoration, and in 1667 presented the Arundel Library to the Royal Society and the famous Arundel marbles to Oxford University. He was envoy to Morocco in 1669 and succeeded his brother as duke in 1670. Consult Evelyn, 'Diary.'

Norfolk, Henry Howard, 7TH DUKE OF, English politician, son of the 6th Duke: b. 11 Jan. 1655; d. London 2 April 1701. He studied at Magdalen College, Oxford; became lord-lieutenant of Norfolk, Berkshire, and Surrey; and was so strong a Protestant that in spite of his personal attachment to James II., he signed the petition for the Convocation Parliament in 1688 brought over the eastern counties to William of Orange, and was made privy councillor in 1689.

Norfolk, Henry Fitzalan Howard, 15TH DUKE OF, English politician: b. Carlton Terrace 27 Dec. 1847. He succeeded to the title in 1860 upon the death of his father, whom he resembles in his zeal for the Roman Catholic Church. He is president of the Catholic Union of Great Britain; acted as special envoy to the Pope in 1887; with the Unionists he opposed Gladstone's Home Rule programme; and from 1895 to 1900 was postmaster-general. He served in the South African war.

Norfolk, John Howard, 1ST DUKE OF, English admiral, supporter of the House of York: b. about 1430; d. Bosworth, Leicestershire, 22 Aug. 1485. He was a great-grandson of Sir William Howard, founder of the family and chief justice of common pleas under Edward I. and Edward II. He served in France, was elected to the Commons in 1455 by the interest of John Mowbray, last duke of Norfolk of that name, thus becoming allied to the House of York. He was knighted upon the accession of Edward IV., fought again in France and against the Lancastrians, and in spite of this was made a baron by Henry VI. He became a lieutenant of Richard III., who made him duke of Norfolk, earl marshal, and admiral of England in 1483; and fighting for Richard at Bosworth he was killed. The title of Duke of Norfolk revived for him had been held by the Mowbrays, from whom he was descended on the distaff side.

Norfolk, Thomas Howard, 2D DUKE OF, English soldier and statesman, son of John Howard, 1st Duke of Norfolk (q.v.): b. 1443; d. Framlingham, Suffolk, 21 May 1524. Like his father he fought for Edward IV. at Barnet (1471) and for Richard III. at Bosworth (1485), but in 1514 recovered his attainted title, becoming one of the most trusted generals of the day. He put down the Yorkshire rising of 1489, defeated the Scotch at Flodden (1513), and on the «Evil May Day» of 1517 repressed with terrible severity a riot in London. His entire subservience to the Crown was shown by his concurring in the condemnation of Buckingham for treason, after acting as lord high steward of the court which tried his friend.

Norfolk, Thomas Howard, 3D DUKE OF, English statesman, son of 2d Duke (q.v.): b. 1473; d. Kenninghall, Norfolk, 25 Aug. 1554. He married Anne, daughter of Edward IV.; served in the navy and in 1513 under his father at Flodden. He opposed the policy of Wolsey and angered the king against him; was less successful in his opposition to Thomas Cromwell; and in 1546 with his son Henry, Earl of Surrey, was accused of high treason. He was condemned to death and rescued only by the death of Henry VIII. He remained in the Tower during Edward VI.'s reign; but was restored to favor under Mary; and in his 81st year showed equal bravery and rashness in leading the forces against Wyatt. His grandson THOMAS HOWARD, 4th Duke of Norfolk, son of the Earl of Surrey: b. 1536; d. Tower Hill 2 June 1572; became duke in 1554; gave largely to the foundation of Magdalene College, Cambridge; was sent to Scotland in 1568 to inquire into affairs there; attempted to marry Mary, Queen of Scots; and as head of the English nobility played a prominent part in the Ridolfi plot in her behalf. He was tried for treason and executed.

Norfolk, Thomas Mowbray, 1ST DUKE OF, (of the first creation), English statesman: b. about 1366; d. Venice 1399. He was elected to Parliament in 1383; served in Scotland in the following year; joined in the prosecution of the favorites of Richard II. by the Merciless Parliament; but was soon reconciled to the king and assisted him greatly in his tyrannical policy toward the nobles. Norfolk arrested Gloucester, Arundel and Warwick, and when bidden to produce Gloucester for trial he said that the prisoner was dead, and very possibly he was responsible for Gloucester's death. He was made Duke of Norfolk in the same year, 1397; but in 1398 was accused of treason and banished from England.

Norfolk, Va., city, port of entry, and United States naval station in Norfolk County; the second largest city of Virginia; on the Elizabeth River, which is an arm of the Chesapeake Bay, the Albemarle and Chesapeake Canal, and Dismal Swamp Canal. It is 116 miles by water and 90 miles in a direct line southeast of Richmond, on the Atlantic Coast Line railroad, the Seaboard A. L., the Chesapeake & O., the Norfolk & W., the Norfolk & S., the Southern and the New York, P. & N. R.R.'s. Portsmouth and Berkley, which are practically a part of Norfolk, are just across the Elizabeth River.

Topography and Climate.— The city covers an area of about four square miles and is laid out on rather level ground. The climate is genial, being tempered by the Gulf Stream, which runs nearer the shore off Capes Henry and Hatteras than at any other point along the Atlantic coast.

Public Buildings.— Among the prominent buildings here are Saint Paul's Church, built in 1737; Public Library (12,000 volumes), Carnegie Library, City Hall, Custom House, Saint Vincent's Hospital, Protestant Hospital, Postoffice, Monticello Hotel, Atlantic Hotel, Norfolk Mission College; upward of 30 churches, an academy for young ladies, an institution for colored students, and there is a beautiful public park embracing 95 acres.

Government.— Under the revised and amended charter of 1884, Norfolk is governed by a mayor, elected every two years, and a city council, with two branches, select and common. The administrative officers elected by popular vote include the school trustees, city treasurer, attorney, street inspector, revenue commissioner, collector of taxes. The cost of maintenance for the city departments amounts to $600,000 annually; the principal items being interest on debt, $175,000; fire department, $50,000; schools, $60,000; street, sewer and drain department, $90,000; and police department, $73,000. The municipal waterworks were built in 1872 and cost $1,236,000. There are 60 miles of street mains in the system. In 1903 the assessed valuation of the city was $30,487,200.

The Naval Station.— Norfolk is 8 miles distant from Hampton Roads and 17 miles from the Atlantic Ocean. Norfolk and Portsmouth, on the opposite side of the Elizabeth River, constitute the largest naval station in the United States. The Norfolk navy yard is located at Portsmouth. The coaling station here handles over 2,500,000 tons annually. The harbor is commodious, accessible for the largest warships

and has a main channel 30 feet deep. The defenses include Fortress Monroe.

Customs.— There is a United States Customs District here, embracing both Norfolk and Portsmouth. The foreign trade in 1900 was represented by imports valued at $318,401 and by exports to the amount of $11,505,000; in 1901 the imports were $594,000; exports $10,308,000; 1902 imports $501,501; exports $7,119,243; 1903, exports $9,297,482; imports 1903, $516,603.

Trade and Commerce.— Norfolk is the terminus of many steamship lines, transatlantic and coastwise, and has a large boat traffic with the interior by canal. It is already an important commercial centre and is growing rapidly in this direction. The commerce of the port includes lumber, coal, grain, cotton, peanuts, oysters, fruit and vegetables. It is the leading peanut market of the world, is the fourth cotton port of the United States, with a business of 600,000 bales annually; an oyster trade of $2,500,000 and a trucking business of $6,000,000. Norfolk has 2 national banks, 6 state banks, chamber of commerce, board of trade, cotton exchange, real estate exchange. The Union stock yard here has an annual business of $2,500,000.

Manufactures.— Many large manufactories were established here in 1901, 1902 and 1903. In 1900 the manufactures represented capital to the amount of $6,425,000, with a production valued at $9,397,000. The industries include cotton knitting-mills, cotton compress-mills, fertilizer factories, ship yards, tobacco and cigar factories, iron foundries, machine shops, steel works, carriage and wagon shops, lumber mills, silk mills, barrel, box and crate factories, brick yards, breweries, bottling works, grain elevators, electric supply works and numerous minor concerns. There are gas and electric light plants here, an electric traction system and daily and weekly newspapers.

History.— The town of Norfolk was first settled in 1680. It was bombarded and nearly destroyed by the British under Lord Dunmore, 1 Jan. 1776. In 1736 the town was incorporated as a borough and was chartered as a city in 1845. The city suffered severely in 1855 from an epidemic of yellow fever. During the Civil War, in April 1861, General Taliaferro entered the city with a large body of Virginia troops. In May 1862, the Federal army took possession of the city and during the interval from April 1861 to May 1862 the city was the chief Confederate naval station.

Population.— In 1860 Norfolk had a population of 14,620; (1880) 21,966; (1890) 34,871; (1900) 46,624. Est. pop. (1904) 55,000. The three cities of Norfolk, Portsmouth and Berkley, which practically form one municipality, have an aggregate population, within a radius of three miles, of 118,000 in 1904.

Bibliography.— Burton, 'History of Norfolk' (1877); Forrest, 'Historical and Descriptive Sketches of Norfolk and Vicinity' (1853); Lamb, 'Our Twin Cities of the 19th Century' (1888).

W. H. LUMSDEN,
Secretary Chamber of Commerce, Norfolk, Va.

Norfolk Island, in the Pacific Ocean, 400 miles northwest of North Cape, New Zealand, nearly midway between that colony and New Caledonia, and about 800 miles east of Australia, is six miles long, and has an area of 8,528 acres, rising in Mount Pitt to a height of over 1,000 feet. The climate is healthful, and the soil fertile and well watered; distinctive features of its flora are the Norfolk Island pine, growing to a height of 200 feet, and the Norfolk Island cabbage, a dwarf pine. Norfolk Island was discovered by Cook in 1774. Between 1788 and 1805, and again between 1826 and 1855, it was a penal settlement for convicts sent from New South Wales. In 1856 many of the inhabitants of Pitcairn Island (q.v.) were transferred hither by the British government. The people govern themselves, under the superintendence of the government of New South Wales, but are indolent, and, owing to intermarriage, a decaying race; they fish, farm, and supply provisions to passing vessels. Pop. (1895) 882.

Norfolk Island Pine. See ARAUCARIA.

Norfolk Spaniel. See SPANIEL.

No'ria, a hydraulic machine used in Spain, Syria, Egypt, and other countries for raising water. It consists of a water-wheel with revolving buckets or earthen pitchers, but its modes of construction and operation are various. As used in Egypt it is known as the sakieh. These machines are generally worked by animal power, though in some countries they are driven by the current of a stream.

Noriac, Jules, zhül nō-rē-äk, pseudonym of Claude Antoine Jules Cayron: b. Limoges, France, 1827; d. Paris, France, 1 Oct. 1882. His novels have won a high reputation and among the most widely known are: 'The Countess of Bruges' (1878); 'The Chevalier de Cerny' (1879); etc.

Normal, nôr'mal, Ill., city in McLean County; at the junction of the Chicago & A. and the Illinois Central R.R.'s; two miles northeast of Bloomington and about 60 miles northeast of Springfield. It was settled about 1840, incorporated in 1850, and chartered as a city in 1867. It is in a productive agricultural region in which considerable attention is given to the cultivation of fruit and nursery stock and to the raising of Norman and French draft horses. It has canning factories, novelty works, and a large trade in farm products, nursery stock, and horses. It is the seat of the Illinois State Normal University and the Illinois Soldiers' Orphans' Home. It has five churches, graded schools, and a library. The bank has a capital of $100,000. The government is administered under special charter and is vested in a president and a council of five members, all elected annually. Pop. (1890) 3,459; (1900) 3,795.

B. H. MCCANN,
Editor 'The Advocate.'

Normal College of the City of New York, founded in 1869, for the training of teachers. The first attempt in New York city to provide public means for teachers to procure professional training was in 1856, when a daily normal school was established, which remained in existence only three years. This was followed by the Saturday Normal School, which proved a source of inspiration to the teachers, and made them strong advocates for more thorough professional work. In 1869 the Normal and High School for young women was established by the Board of Education; in 1870 the name was

changed to Normal College. Graduates of grammar grades were then admitted and the course was for three years. The first president, Thomas Hunter, still (1903) continues as the head of the school. The board of trustees consists of the president of the college and the Board of Education of the public schools of the city. The entrance requirements and the course of study have been raised, and now (1903) the institution has a professional course of six years and a collegiate course of seven years, with power to grant degrees. It has a model kindergarten and a model elementary school, an excellent library and five well equipped laboratories. From 1870 to 1903 there have been about 10,000 graduates. Of this number 1,870 were graduated between 1870 and 1880; 2,517 between 1880 and 1890; and 3,379 between 1890 and 1900. A large number of the teachers in New York city are graduates of this college.

Normal School, Manila, established in 1901 by the superintendent of public education for the Philippines. From 10 April to 10 May 1901, a preliminary term of school was conducted under the direction of the superintendent of schools for the city of Manila. Arrangements were made to secure favorable rates of transportation for teachers distant from Manila, and students came from all parts of the archipelago. There were in attendance 600 students, 10 per cent of whom spoke English. Considerable attention was given to subject matter. The average daily attendance was 98 per cent. Many of the pupils remained as regular attendants at the normal school; and the work was most satisfactory during 1901 and 1902, although subject matter was given much more attention than methods. A practice school, well equipped, is one of the strong features. In 1903 there was a large class sufficiently advanced in English to begin regular professional work. The method department was placed in charge of Gertrude Robinson, a teacher from the Indiana State Normal at Terre Haute. The classification in the practice school is first based almost wholly upon ability to speak, read, and write English. The number enrolled in the regular normal department up to 1 Jan. 1902 was 310. The number of provinces represented was 24.

In conjunction with the Manila Normal School there are five tributary normal schools: at Vigan, province of Ilocos Sur; Nueva Cáceres, province of Camarines Sur; Iloilo, province of Panay; Cebú, province of Cebú; and Zamboanga, province of Mindanao. The pupils spend three years in the provincial school and then one year of final training in the Manila school.

In the capital of each province, a normal school is held during the long vacation; attendance is required of all the native teachers. The division superintendent in each district has charge of the vacation normal school held in his district. This vacation normal school must continue four weeks, but a six weeks' session is recommended. The normal school at Manila is practically the head centre for all the public method schools of the archipelago.

Normal Schools. See SCHOOLS, NORMAL.

Norman, nôr'man, **Henry,** English traveler and author: b. Leicester, England, 19 Sept. 1858. He was graduated from Harvard in 1881 and later studied at Leipsic. In 1882 he began the public agitation for the preservation of Niagara Falls, which resulted in the purchase of land on both sides of the Falls by the State of New York and the Dominion of Canada for use as a public park. He was for several years on the editorial staff of the *Pall Mall Gazette;* and in 1895 became assistant editor of the London *Daily Chronicle,* resigning that position in 1899; he has also been London correspondent of the New York *Times* and Chicago *Tribune.* He has traveled widely in the United States and Canada, and also in Japan, Russia, Siberia, Central Asia, Korea, China, Siam, the Malay Peninsula, Egypt and the Balkans. In 1902 he founded the 'World's Work,' an illustrated monthly of which he has since been editor. In 1900 he was elected to the British Parliament from South Wolverhampton. He has written 'An Account of the Harvard Greek Play' (1881); 'The Preservation of Niagara Falls' (1882); 'The Real Japan' (1892); 'The Peoples and Politics of the Far East' (1895); 'The Near East' (1899); 'All the Russias' (1902); and 'Delhi' (1902).

Norman, Okla., city, county-seat of Cleveland County; on the Atchison, T. & S. F. railroad; about 48 miles south of Guthrie and 30 miles south of Oklahoma. It is in an agricultural region in which the cultivation of wheat and cotton, and cattle-raising are the chief occuptions. The principal manufactures are flour, cottonseed-oil, and ice. It has considerable trade in wheat, flour, cotton, cottonseed-oil, and live-stock. It is the seat of the University of Oklahoma (q.v.) and it has the Territorial Insane Asylum. There are 11 churches and two public schools. The two banks have a combined capital of $100,000. The government is vested in a mayor and a board of aldermen of eight members. Pop. (1890) 787; (1900) 2,225.

W. M. CARR,
Editor, 'Democrat Topics.'

Norman Architecture. See ARCHITECTURE.

Norman Conquest, in English history, the successful attempt made by William of Normandy in 1066 to secure the English crown from his rival Harold, son of Earl Godwin. It was no real conquest of the land and people by an alien race, but rather resembled in its chief characteristics the accession of William of Orange to the throne in 1688. Any immediate evil effects were more than counterbalanced by the advantages which it conferred on England, such as the grafting on Anglo-Saxon institutions of the better organization and greater mastery of law of the Normans; the bringing of England more into touch with European politics, and the consequent beginning of her ever-widening foreign relations; the repression of internecine strife and the greater security of life and property; the great impetus given to architecture and to many of the industrial arts; and finally its great influence on the development of the old English language into modern English. See ENGLAND, *History.*

Norman French, the language spoken by the Normans at the time of the Conquest. It continued to be the legal language of England till the reign of Edward III., and certain phrases are still employed on particular state occasions. It exercised a considerable influence on the Anglo-Saxon, and is still spoken among the

native population of the Channel Islands (q.v.), the remnant of the Norman possessions belonging to Great Britain. See NORMANDY.

Norman Law. See LAW; NORMANDY.

Normanby, nôr'mạn-bĭ, **Constantine Henry Phipps,** 1st MARQUIS OF, English statesman: b. England 15 May 1797; d. South Kensington, England, 28 July 1863. He was educated at Trinity College, Cambridge and in 1818 entered Parliament, sitting for Scarborough. In 1832 he was appointed captain-general and governor of Jamaica and in 1835 was made lord-lieutenant of Ireland, where he was extremely popular. He was secretary of war and of the colonies in 1839 and later was transferred to the home secretaryship which he occupied until 1841. He wrote: 'The English in Italy' (1825); 'A Year of Revolution' (1857); 'Vindication of the Duke of Modena' (1861); and several novels, one of which was 'The Contrast' (1832).

Normand, nôr'mand, **Henrietta Rae,** English painter: b. London 30 Dec. 1859, daughter of T. B. Rae; married Ernest Normand, painter, 1884. She was educated in London art schools, and was awarded a medal at the Paris and Chicago Universal Expositions. Since 1880, when she first exhibited at the Royal Academy, she has been represented there every season. Some of her most important pictures are 'Ariadne' (1885); 'A Naiad' (1886); 'Eurydice' (1880); 'Death of Procris' (1889); 'Ophelia' (1890); 'Apollo and Daphne' (1895); 'Diana and Calisto' (1899); 'Sir Richard Whittington and his Charities,' a fresco for the Royal Exchange (1900).

Normand, Jacques Etienne, zhäk ā-tē-ĕn nôr mäñ, French communist: b. Abbeville, France 1809; d. San Antonio, Texas, 1867. He was a Saint Simonist, and during the revolution of 1848 in France, petitioned the legislature for permission to establish a communistic colony; he was banished from France when Louis Napoleon became president, and came to the United States. Buying considerable land near San Antonio, Texas, he established a communistic colony called Réunion, which prospered for a time, but which was finally suppressed by the Texas legislature. While trying to establish another colony, he was arrested and imprisoned. He wrote 'Principes de Socialisme' (1840); 'Théorie de la Commune Naturelle' (1855); 'Théorie de la Republique Communiste Universelle' (1860).

Normandy, nôr'mạn-dĭ, France, an ancient province bordering on the English Channel, now divided into the departments of Seine-Inférieure, Eure, Orne, Calvados, and Manche. It is a fertile region, with well-cultivated fields and fruitful orchards, and the people are intelligent and industrious, ranking among the best and most energetic of French provincials. Under the Romans this portion of the country formed part of *Gallia Lugdunensis Secunda;* after the Franks' invasion it made a constituent part of the kingdom of Neustria, and was given by Charles the Bald to the Duke of Paris. From the middle of the 9th century its coasts were harried by the vikings or Northmen (see NORMANS), who early in the 10th century established themselves in such force along the Seine that Charles, king of the Western Kingdom, was glad to arrange a treaty with their leader Rolf (Rollo, Rou) at Clair-sur-Epte in 912, practically ceding the region which henceforth was known as Normandy. Its capital was Rouen, and it comprised Upper Normandy, with the towns of Dieppe, Evreux, Harfleur, Havre, Honfleur, Lisieux, Rouen, and Yvetot, and Lower Normandy with Caen the chief town, Alençon, Auranches, Bayeux, Cherbourg, Contances, Falaise, Granville, and Saint Lô. Rollo's most distinguished successor was William I., Duke of Normandy, who invaded England in 1066, and established a Norman dynasty, thereby uniting Normandy with the latter country. Philip Augustus conquered Normandy in 1204, the French holding it till 1417, when it was recovered by the English, who held it till 1450, when it was finally wrested from them by Charles VII. The Channel Islands (q.v) are a remnant of the Norman possessions still belonging to the descendants of the Norman kings of England, where down to the present day the law administered in the royal courts is virtually the *Grand Coutumier de Normandie,* or the old customary law of Normandy. One feature survives in the Cry of Haro. This ancient customary law of Normandy seems to have been collected in writing on three separate occasions. The earliest collection was apparently written down by private persons in 1200 and about 1220, and had no official character; the third collection (1585) is a revised edition of the second, the *Grand Coutumier,* completed early in the 14th century. Consult: Freeman, 'Norman Conquest' (1877); Palgrave, 'History of Normandy' (1878); Spence, 'Dreamland in History' (1890).

Nor'mans, or **Northmen,** a general name given the people of ancient Scandinavia, or Norway, Sweden, and Denmark. This name was given to them in the Netherlands, in Germany, and France; in Great Britain they were called Danes. They were fierce and warlike tribes, who made piratical expeditions to all parts of the European seas, plundering by land and by sea, and often overrunning large tracts of country, in which they practised every enormity. «They had scarcely any inducements,» says Mackintosh, the English historian, «to spare countries which they visited only to plunder, and where they did not hope to dwell; they were less than others liable to retaliation, and they had neither kindred, nor family, nor home. They were, perhaps, the only barbarians who applied their highest title of magistracy to denote the leaders of piratical squadrons, whom they termed *vikingr* or *sea-kings.* Not contented with their native and habitual ferocity, some of them sought to surpass their companions by working themselves into horrible and temporary insanity.» *Vikingr* does not, however, mean sea-kings, but is derived from *vik,* a bay or creek. The poverty of their country compelled them to adopt this means of subsistence, and their religion inspired them with a love for daring enterprises, since it taught them that warriors fallen in battle were admitted to Valhalla, the northern paradise.

In 795 some Norwegians established themselves in the Faröe Isles and in Orkney; toward the middle of the 9th century they founded the governments of Novgorod and of Kiev, in Russia; and after the discovery of Iceland certain powerful Norwegian families, taking refuge from the

persecutions of Harold, king of Denmark, settled in that island. The Northmen began their piratical excursions in the first part of the 9th century, and soon covered the sea with their boats, and ravaged the coasts of England, Germany, Friesland, Flanders, and France. Under the feeble reigns of Charles the Bald and Charles the Fat they ascended the rivers to the very heart of France, and plundered Paris itself. It became necessary to purchase their retreat with gold. Their incursions into France were afterward renewed, and Charles the Simple was obliged (912) to cede to them a part of Neustria, which was afterward called, from them, *Normandy* (q.v.), and to give his daughter in marriage to Rollo, their chief. Rollo embraced the Christian religion, was baptized under the name of Robert, and became the first Duke of Normandy, and a vassal of the King of France. His followers received the religion of their leader, and abandoned their roving and piratical habits; though they still retained, as also did their descendants for a long time, marks of their Scandinavian origin, and that warlike ardor which had rendered them so terrible to those against whom they directed their attacks. Great Britain was, for about two centuries, desolated by the Danes, as the Northmen were there called. Egbert, in the beginning of the 9th century, had no sooner made some approaches toward a regular government, and the establishment of tranquillity, than the "Scandinavian heathens," as the Saxons termed them, made their appearance. Alfred (871–901) finally delivered the country from the invaders, after they had subdued the whole land except the "isle of the nobles," into which the king had retreated with a few nobles. But the relief was only temporary: they returned, under his successors, in greater force, obtained possession of the northern and eastern part of the country, and in the beginning of the 11th century three Scandinavian princes (Canute, Harold, and Hardicanute) ruled over all England for the space of about 25 years. The Saxon line was then restored; but in 1066 William, duke of Normandy, obtained the English throne. This conquest, as it is commonly called, had a most important influence on the Saxon manners, language, and constitution, which had hitherto escaped with little change, and is therefore one of the most important epochs in English history. In the year 1000, according to the Saga narratives, Leif, son of Eric the Red, leaving Greenland, which had been discovered and settled by his father, a Norwegian, proceeded southward in a ship, accompanied by 35 men, and discovered the American coast, to which he gave the name of Vinland. In 1007 a rich Greenlander, with a following of 60, emigrated to Vinland, and there planted a colony, which seems to have thriven, but after a time we hear nothing more about it. The Normans also established a new kingdom in Naples in 1016. The foreign expeditions of the Northmen gradually diminished their numbers and strength at home, and rendered them less formidable.

Consult: Depping, 'Histoire des Expéditions maritimes des Normands et de leurs Etablissements en France au Xme Siècle' (1826); Du Chaillu, 'The Viking Age' (1890); Freeman, 'History of the Norman Conquest of England' (1877); Keary, 'Vikings in Western Christendom' (1891).

Norns, nôrnz, in Scandinavian mythology, the three Fates, representing the past, the present, and the future, whose decrees were irrevocable. They were represented as three young women, named respectively Urd, Verdandi, and Skuld. They sit by the well of Urd, under the world-tree Ygdrasil in Asgard, and there determine the fate of both gods and men. Besides these three there are many inferior norns, both good and bad, answering to the genii of classical mythology; to such are attributable the unequal destinies of men in the world. Women who possessed the power of prediction or magic also bore this name.

Nor'ridgewock Indians, an American tribe of the Algonquin family. They formerly lived along the Kennebec River in Maine, and were frequently called Kennebec Indians. They were patrons of the French missionaries and were regarded as dangerous enemies of the English colonists. The latter sent an expedition against the Norridgewocks in 1724, and the tribe was practically annihilated.

Norris, nôr'is, **Edwin,** English linguist: b. Taunton, Somerset, England, 24 Oct. 1795; d. Brompton, England, 10 Dec. 1872. His early youth was spent in tutoring, and in 1818–37 he was a clerk with the East India Company. In 1837 he became assistant secretary of the Royal Asiatic Society and in 1859 its secretary. His time was principally devoted to the study of the Semitic languages and the Celtic dialect, and he was an authority on cuneiform writing. His greatest work is his 'Assyrian Dictionary' (1868–72).

Norris, Frank, American novelist and journalist: b. Chicago 1870; d. San Francisco 25 Oct. 1902. He studied at the University of California and at Harvard, after three years as an art student in Paris; was war correspondent of the San Francisco *Chronicle* in South Africa in 1895–6; edited the San Francisco 'Wave' 1896–7; wrote articles from Cuba for 'McClure's' in 1898; and was the author of several virile realistic novels: 'McTeague' (1899), 'Moran of the Lady Letty,' a romantic story (1900); 'The Octopus,' a story of wheat raising and transportation (1901), and 'The Pit,' dealing with wheat exchange and gambling. The two last named stories are epical and Zolaesque in manner, and were to have been concluded by 'The Wolf,' a story of European famine.

Norris, Henry, English courtier: d. London, England, 17 May 1536. He became a member of the court in early youth and was a favorite of Henry VIII., holding under him many important offices. He was instrumental in accomplishing the downfall of Wolsey and was a friend of Anne Boleyn while she was gaining her foothold at court. Later he was suspected by the king of an undue intimacy with Anne and though doubtless innocent was imprisoned in the Tower and executed.

Norris, Mary Harriott, American novelist: b. Boonton, N. J., 16 March 1848. She was graduated from Vassar College in 1870, was principal of a private school in New York 1880–96, and dean of the woman's department of Northwestern University, Evanston, Ill., 1898–9. Among her published books are: 'A Damsel of the 18th Century' (1889); 'The Gray House of

the Quarries' (1898); 'The Grapes of Wrath' (1901).

Norris, William Edward, English novelist: b. London, England, 18 Nov. 1847. He was the son of a former chief justice of Ceylon; was educated at Eton, and admitted to the bar in 1874, but never practised. His first novel, 'Heaps of Money,' appeared in 1877, and was successful. It was succeeded by 'Mademoiselle de Mersac' (1879); 'Matrimony' (1881); 'No New Thing' (1882); 'His Grace' (1892); 'A Deplorable Affair' (1893); 'A Victim of Good Luck'; 'Billy Bellew'; 'A Dancer in Yellow' (1896); 'Clarissa Furiosa' (1898); 'Marietta's Marriage'; 'The Widower' (1897); 'Giles Ingilby' (1899); 'An Octave' (1900); 'Lord Leonard the Luckless' (1903); and other fictions, all of which have enjoyed popularity both in England and this country. He has shown not a little skill in character drawing and his dialogue is entertaining and natural.

Nor'ristown, Pa., borough, county-seat of Montgomery County; on the Schuylkill River, the Schuylkill Canal, and on the Philadelphia & R. and the Pennsylvania R.R.'s; about 15 miles northwest of Philadelphia. It was settled about 1688 by a colony from Wales, laid out in 1785, and incorporated as a borough in 1812. It was named in honor of Isaac Norris, who owned a large tract of land in what is now Montgomery County. It is in an agricultural and mining section of the State, and has extensive manufacturing interests. The chief manufactures are knitting machines, hosiery, men's underwear, glass, iron, wire, screws, machine-shop products, agricultural implements, iron and wood furniture. It has considerable trade in manufactured articles and farm products. Some of the prominent buildings are the county court-house, city buildings, Masonic Temple, and the county prison. It has a State Hospital for the Insane, Charity Hospital, Saint Joseph's Protectory (R.C.) for girls, Friend's Home, and the Agnes Stinson Home for Aged Ladies. The educational institutions are a high school, public and parish schools, the Montgomery Historical Society, and the McCann library. The tomb of Winfield Scott Hancock (q.v.) is here in Montgomery Cemetery, also a memorial shaft to John F. Hartranft. Valley Forge (q.v.) is only six miles west by north, and many other places of historic and scenic interest are in the vicinity. The government is vested in a burgess, who holds office three years, and a council. The electric-light plant is owned and operated by the borough. Pop. (1890) 19,791; (1900) 22,265.

Norrköping, nôr'hĕ-pĭng, Sweden, seaport, on the southeast coast, on the Bravik River; about 80 miles southwest of Stockholm. It was founded in 1384, but it has several times been destroyed by fire. The Motala, a rapid river, flows through the city and furnishes extensive water-power which is used for manufacturing. In 1902 there were over 180 manufacturing establishments, whose annual products were valued at over $10,000,000. It is an important commercial city, and has an extensive trade in its manufactures of cotton and woolen goods, carpets, paper, etc., and in the imports which are re-shipped at Norrköping for the interior. Pop. (1902) 43,128.

Norrland, nôr'länd, Sweden, the largest of the three historical divisions of Sweden; in the northern part; area, 80,785 square miles. It has a cold climate, well-wooded in the south, scanty vegetation in the north. The towns and villages are chiefly in the southern part; but few settlements are in the northern part. Pop. (1901) 860,254. See SWEDEN.

Norse, the language of Scandinavia, especially in its earlier forms. Old Norse is represented by the classical Icelandic, and still with wonderful purity by modern Icelandic. See ICELAND; SCANDINAVIA.

Norse Mythology. See MYTHOLOGY.

Norse'man, or **Northmen.** See NORMANS.

North, Christopher, the pseudonym of one of the authors of the 'Noctes Ambrosianæ.' See WILSON, JOHN.

North, SIR **Dudley,** English financier and economist, 3d son of the 4th Lord North: b. Westminster 16 May 1641; d. Covent Garden 31 Dec. 1691. He early entered the employ of a merchant in Turkey; became treasurer of Turkey Company; returned to England in 1680; was one of the sheriffs of London in 1682 and a commissioner of customs in 1683; and retired from public life shortly after the accession of William and Mary. He was a man of great ability, one of the first Englishmen to urge the doctrine of free-trade, and the author of an important pamphlet on the 'Currency.'

North, Francis, BARON GUILFORD, English lord chancellor, brother of Dudley and Roger North (qq.v.): b. Kirtling, Cambridgeshire, October 1637; d. Wroxton, Oxfordshire, 5 Sept. 1685. He was educated at Cambridge, and studied law at the Middle Temple. His rise was rapid: in 1671 he was knighted; in 1673 became attorney-general; and from 1675 to 1682 was chief justice of the court of common pleas. In 1682 he became lord chancellor, was created Baron Guilford in 1683, and died soon after assisting at the coronation of James II. His uncompromising royalism made him the object of contemporary attack and present misunderstanding, notably in Lord Campbell's 'Lives of the Lord Chancellors.' It is to an early attack of this nature, namely that in Kennett's 'Complete History' that we owe Roger North's 'Apology' for his brother, which grew into the 'Lives of the Norths.' The conflict of testimony makes his personal character problematical, but it is certain that he was a learned lawyer and a patron of literature, the arts, and the sciences.

North, Frederick, LORD, EARL OF GUILFORD, English statesman, George III.'s prime minister during the American Revolution: b. London 13 April 1732; d. there 5 Aug. 1792. His father was Francis, 1st Earl of Guilford. He was educated at Eton and Oxford; studied and traveled abroad for three years; and in April 1754 was elected to the House of Commons for one of his father's pocket-boroughs. From June 1759 to July 1766 he was a junior lord of the treasury; and in 1767 became chancellor of the exchequer and leader of the House of Commons upon the death of Townshend, whose measures taxing the American colonies Lord North carried through, and in this particular as in general showed himself the "King's friend" and entirely indifferent to the wishes of the people. Early in 1770 he became

prime minister, but was none the less merely the King's tool; in March 1774 he succeeded in passing the celebrated Boston Port Bill and Massachusetts Bill; and though he seems to have seen soon after the King's policy was a mistaken one and could result only in the loss of the colonies, and although he urged in 1775 that the colonies, if they taxed themselves, should not be taxed by Parliament, he still supported the King's obstinate policy and remained in office, while his government grew steadily weaker because of the defection of men whose scruples, identical with his, carried some force with them. On 20 March 1782 he resigned, just in time to forestall a motion for the dismissal of the cabinet. In February of the next year by a dexterous coalition with his old enemy, Fox, he secured the dismissal of Shelburne, was a member of the coalition cabinet of 1783, and thereafter acted with the opposition against Pitt. The last five years of his life Lord North was blind, but still took some interest in politics, and spoke occasionally in the House of Lords, of which he became a member in 1790 upon his father's death. Personally he was clumsy, awkward, very short-sighted, with an unintelligent puffy face, expressionless eyes, and heavy lips, closely resembling George III. As prime minister he was the King's agent; indeed, he refused to be called prime minister, denying the place of any such office in the British constitution. After his coalition with Fox he broke with the Crown, however, and refused George III.'s urgent offers to make him premier in 1783. He was neither a great statesman nor a great orator, but had a gift of humor, wit, and pleasant temper. Consult: Donne, 'Correspondence of George III. with Lord North' (1867); Lecky, 'History of England' (1882–7); Lewis, 'Administrations of Great Britain' (1864).

North, Roger, English colonist in America; b. about 1585; d. 1652. He was the son of Sir John North, and a grandson of Roger, 2d Baron North, and in 1617 accompanied Sir Walter Raleigh to Guiana, did good service against the Spaniards on the Orinoco, and remained faithful to his commander to the last. In 1619 he applied for a patent to trade along the Amazon, and, when this was denied him because of Gondomar's influence with the King, sailed from Plymouth without leave in May 1620. Hence he was imprisoned upon his return. In 1627 he received letters-patent to found Guiana, but spent the last years of his life in England. North planted the English power in South America and was one of the most notable colonial projectors of his day.

North, Roger, English lawyer and historian, brother of Dudley North and Francis North (qq.v.): b. Tostock 3 Sept. 1653; d. Rougham 1 March 1734. He studied at Jesus College, Cambridge; became a barrister at the Middle Temple; rose rapidly in the practice of law, becoming attorney-general to the Queen in 1682; left political life upon the accession of William and Mary; and spent the rest of his life in retirement. He was a famous book-collector, but is best known for his 'Lives of the Norths,' an invaluable picture of the life of the period, as is his 'Autobiography.' Both these books are included in Bohn's Library (1890). His strong Tory sentiments are to be seen in the 'Examen,' a critical inquiry into the truth of White Kennett's 'History of England.' North also wrote 'Memoires of Musick' (ed. by Rimbault in 1846).

North, Sir **Thomas,** English translator of Plutarch, son of the 1st Baron North: b. about 1535; d. about 1601. He studied at Peterhouse, Cambridge; entered Lincoln's Inn 1557; and in 1579 published his version of Plutarch's 'Lives,' actually a version from the French of Amyot. It was dedicated to Queen Elizabeth, was very popular in her day, and was the immediate source of most of Shakespeare's classical plays, notably 'Antony and Cleopatra,' 'Coriolanus,' 'Julius Cæsar,' and 'Pericles,' some of which have entire speeches taken scarcely with a change from North. North also translated Guevara's 'Libro aureo,' a Spanish adaptation of the 'Meditations of Marcus Aurelius,' thus rendering Euphuism out of Spanish into English; and a collection of Oriental fables from the Italian of Doni. Consult: Skeat, 'Shakespeare's Plutarch' (1875); and Leo, 'Four Chapters of North's Plutarch' (1878). The complete version is to be found in the 'Temple Classics,' and in a splendid reprint in the 'Tudor Translations' (1895).

North, William, American soldier: b. Fort Frederick, Pemaquid, Maine, 1755; d. New York 3 Jan. 1836. He entered the Revolutionary army in 1775 and served under Arnold in the Quebec expedition. In 1779 he was aide-de-camp to Baron Steuben whom he greatly assisted and who at his death bequeathed to North the bulk of his property. He was present at the surrender of Cornwallis and remained in the army after the war, rising to the rank of brigadier-general in 1798. He sat in the New York State assembly and from 1789–99 was a United States Senator. He was mustered out of service in 1800. He wrote a biography of Baron Steuben.

North Adams, Mass., city in Berkshire County; on the Hoosac River and on the Boston & M. and the Boston A. R.R.'s; about 50 miles northwest of Springfield. It was settled in 1765 and was part of Adams until 1878 when it was incorporated as a town, and in 1895 was chartered as a city. It includes the villages of Brayton, Greylock, Beaver, and Blackington.

It is situated in a beautiful section, amid the Berkshire Hills, at the base of Greylock, the highest peak in the State. In the western part of the city may be seen the site of old Fort Massachusetts, captured in 1746 by French and Indians under command of Vaudreuil. Hudson Brook and its natural bridge are points of interest, and near is the famous Hoosac Tunnel. The chief industrial establishments are machine-shops, cotton and woolen mills, boot and shoe factories, print goods factories, creameries, and cigar factories. The trade is chiefly in manufactures, farm and dairy products. It has a city hospital, good municipal buildings, and a number of fine church edifices. The educational institutions are a State Normal School, high schools, public and parish schools, and the North Adams Library. The charter of 1895 provides for a mayor, who holds office one year, and a council. The school committee, assessors, and library trustees are elected by popular vote. The city owns and operates the waterworks. Pop. (1890) 16,074; (1900) 24,200. Consult: Spear, 'History of North Adams'; 'Berkshire Hills.'

North America. See AMERICA; CANADA; CENTRAL AMERICA; UNITED STATES.

North American Phalanx, the most important colony founded by the Fourierists in the United States. It was organized in 1843, and located in Monmouth County, N. J., about 40 miles south of New York. The organization was on the joint stock principle, and all the members were engaged in the co-operative labor of the colony; they were paid a certain amount for labor, for talent (or administration) and for capital invested; the rule was to pay the highest prices for the hardest and most disagreeable labor. The labor was at first mostly agricultural, products being sold outside the colony; but later mills were built and a considerable amount of manufacturing done. A common school education was provided. The life was simple and pleasant, there was a library and reading room, but the colony lacked many of the elements of culture that distinguished the life of Brook Farm (q.v.). The management was good, and for many years the colony prospered; in 1853 dissensions resulted in a secession of some of the members, and the founding of a new phalanx; in 1854 the mills were burned down, a serious loss that badly crippled the colony; and in 1856 the organization was formally dissolved. Consult Noyes, 'History of American Socialisms.'

North An'dover, Mass., town in Essex County; on the Boston & M. railroad; about 30 miles north of Boston. It was a part of Andover until 1855 when it was incorporated as a town. It is a manufacturing place, but a large portion is reserved for residential purposes, and it is noted for its beauty and healthfulness. The chief manufactures are woolen goods, mill machinery, and wood products. The government is administered by town meeting. The waterworks are owned and operated by the town. Pop. (1890) 3,742; (1900) 4,243.

North Anna, Operations on the. After the loss of 18,000 men in assaulting Gen. Lee's lines at Spottsylvania Court House, Gen. Grant concluded to turn Lee's position by a movement that would bring him nearer to Richmond, and possibly interpose his army between Lee and that place. The movement was begun on the night of 20 May 1864 by Hancock's Second corps, which, preceded by Torbert's cavalry, marched for the Mattapony and North Anna rivers. Torbert attacked and drove Kemper's brigade from an intrenched position at Milford Station and across the Mattapony, Hancock following and intrenching beyond the river on the 21st. Other corps followed Hancock, and Grant's advance reached the North Anna in the forenoon of the 23d at Island and Jericho fords and Chesterfield bridge, the latter a mile above where the Richmond and Fredericksburg Railroad crosses the river. But Lee was in his front. He had detected the movement and put his army in motion for Hanover Court House, and on the morning of the 23d was south of the North Anna, in position covering the roads and railroads leading to Richmond. Here he was joined by Gen. Breckinridge from the Shenandoah Valley, and by Pickett's division from near Richmond. Ewell's corps was on the right, Anderson's in the centre, and A. P. Hill's on the left. Breckinridge and Pickett were in reserve. Gen. Warren, with the Union Fifth corps, crossed the river at Jericho Ford, constructed a pontoon-bridge, and at 4:30 P.M. of the 23d his entire corps was in line of battle about half a mile from the river and on the edge of a wood next to it, the front being covered by the wood. Cutler's division was on the right, Griffin's in the centre, and Crawford's on the left, its flank resting on the North Anna. About 6 P.M. Wilcox's division of A. P. Hill's corps fell upon Cutler's division and part of Griffin's, driving back Cutler in some disorder, following him, and uncovering Griffin's right; but Griffin drew back his right, Bartlett's brigade hastened to his support, and Wilcox was driven back with a severe loss in killed and wounded, and nearly 1,000 prisoners. Warren lost about 350 men. About the same time Hancock had prepared to force a passage at Chesterfield bridge. A part of Kershaw's division held a bridge-head north of the stream; that was charged and carried about 6 P.M. by the brigades of Cols. Pierce and Egan, with the loss of 150 men, the Confederates retreating across the river. The crossing of the river by Warren, and Wilcox's unsuccessful effort against him, forced Gen. Lee to change and shorten his line during the night of the 23d, until it was nearly in the form of a right-angled triangle, with the right angle opposite Ox Ford and extending down the river three fourths of a mile, then southeast to near Hanover Junction. The left, under A. P. Hill, ran from Ox Ford southwest across the Virginia Central Railroad to Little River. On the morning of the 24th Hancock crossed the river unopposed, and began to intrench within 700 yards of Lee's line, where about 6 P.M. Smyth's brigade was attacked and became sharply engaged. Barlow's division was got ready to attack, but Lee's intrenchments were found so strong that the attack was abandoned. At the same time Wright's Sixth corps crossed the river at Jericho Ford and joined Warren. Burnside's Ninth corps arrived at Ox Ford but could not cross in the front of the blunt angle of Lee's line holding the south side, upon which Potter's division was sent to the left and crossing lower down, formed on Hancock's right, while Crittenden's division moved up stream to near Quarles' Mill, and crossing joined Crawford's division of Warren's corps. Crittenden, supported by Crawford, moved forward to connect with and open the way for Wilcox's division to cross, but was attacked by Mahone's division and driven back with severe loss. Everywhere Lee was found well intrenched. Grant found himself in a false position; his two wings on one side of a stream, difficult at all times to cross, and liable to sudden rise by heavy rains, while his centre was on the other side, with Lee's centre like a blunt wedge, standing ready to receive him, and interposing between his wings, neither of which could support the other. The trains were ordered to recross the river on the 25th, and on the night of the 26th Grant recrossed and, marching to the left 32 miles, crossed the Pamunkey at and near Hanover Town by the afternoon of the 28th, and was in connection with his new base at White House. Consult: 'Official Records,' Vol. XXXVI.; Humphreys, 'The Virginia Campaign of 1864-65'; Walker, 'History of the Second Army Corps'; Grant, 'Personal Memoirs,' Vol. II.; Pennypacker, 'Life of

Gen. Meade'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV.

E. A. CARMAN.

North Attleboro, ăt'l-bŭr-ō, Mass., town in Bristol County; on the New York, N. H. & H. railroad; about 30 miles southwest of Boston. It includes the villages of Oldtown, Adamsdale, Falls Village, and Robinsonville. It was settled in 1637 and incorporated in 1887. The chief industries of the town are connected with the manufacturing and sale of jewelry. It has establishments for the manufacture of boxes, buttons, braid, cotton yarn, rope, silverware, machinery and supplies for the jewelry business. Some of the prominent buildings are the G. A. R. Memorial Hall, the Holmes Memorial building, the high school, and the Richards Memorial Library. The government is administered by town meetings. The town owns and operates the electric-light plant and the waterworks. Pop. (1890) 6,727; (1900) 7,253.

North Bay, Canada, town in Nipissing district, in the Province of Ontario; on the north shore of Lake Nipissing, and on the Grand Trunk and the Canadian P. R.R.'s. A United States consul is stationed here. It is a favorite resort for sportsmen on account of the abundance of fish and small game. Pop. (1901) 2,530.

North Berwick, bĕr'ĭk, Scotland, a fashionable watering-place, formerly a fishing village of Haddingtonshire, at the entrance to the Firth of Forth, 23 miles northeast of Edinburgh. Behind it rises conical North Berwick Law (612 feet). Tantallon Castle three miles east fronting the Bass Rock is a magnificent ruin, finely described in Scott's 'Marmion.' Pop. (1901) 2,784.

North Borneo. See BORNEO.

North Brabant, brä-bänt' or brä'bant, Netherlands, a frontier province bordering on Belgium. See BRABANT; NETHERLANDS.

North Brad'dock, Pa., borough in Allegheny County; on the Pennsylvania railroad; about six miles east of Pittsburg and two miles east of Homestead. It was a part of Braddock until 1897. It has extensive steel rail interests, but a portion of the borough is a residential reserve. The government is vested in a burgess, who holds office three years, and a council. Pop. (1900) 6,535.

North Cape. See CAPE NORTH.

North Carolina, kăr-ō-lī'na, one of the original 13 colonies, midway between Maine and Florida; bounded by Virginia on the north, by Tennessee on the west, by South Carolina and Georgia on the south and southwest and the Atlantic Ocean on the east. It extends from lat. 35° 51½′ to 36° 33′ N., and lon. 75° 27′ to 84° 20½′ W. from Greenwich, taking the greatest width each way. Tennessee originally was part of North Carolina, but in 1790 was ceded by it to the United States.

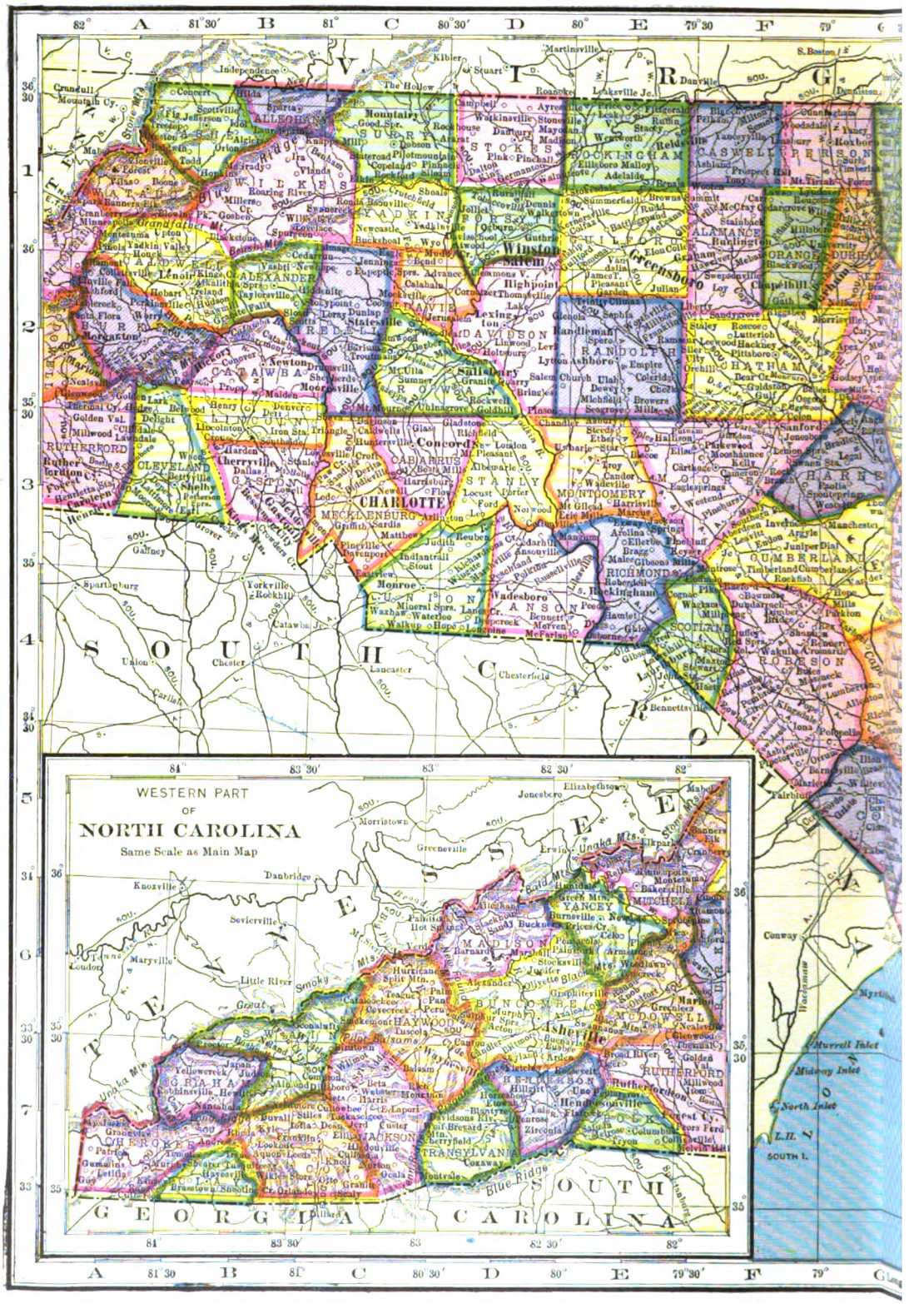
Area.— North Carolina ranks the 17th State in size in the Union, and is the largest on the Atlantic coast save Georgia and Florida. It contains 52,286 square miles (including the area 3,620 square miles of its sounds and rivers) and is slightly larger than England. Its surface is very nearly a one thousandth part of the land area of the globe. Its greatest length from east to west, from "Cherokee to Currituck" is more than 500 miles and its greatest width north and south is 188 miles.

Topography.— The State is divided by nature into three divisions — Eastern, which is generally level, with many swamps and sandy, farther back with two great sounds near the ocean, the Albemarle and Pamlico; the Central or hilly regions; and the Western which is mountainous. The coast line of more than 300 miles runs at first east of south, thence southwest. Along the whole ocean coast stretches a chain of narrow, barren sand banks, broken occasionally by inlets which are constantly changing, occasionally filling up entirely in the course of years and new ones being opened by storms. The Eastern Division extends inland from the ocean about 150 miles. The dividing line between it and the Central Division trends southwestwardly and was once the shore line of the ocean, all east of it having been in prehistoric ages the bed of the sea. This line is clearly marked by the falls of the rivers. This Eastern Division contains the two great sounds already named into which the Chowan, the Roanoke, the Tar, the Neuse, and other rivers pour their waters. Farther south, the Cape Fear and its tributaries empty directly into the Atlantic. The Central Division, beginning at an elevation above sea-level of about 200 feet, extends an average width of 200 miles westwardly, rising gradually to an average elevation of 1,200 feet or more at the foot of the Blue Ridge. The western part of this Central region is called the "Piedmont section." The Western Division contains 6,000 square miles and has an average elevation of 2,500 feet. The highest peaks east of the Rocky Mountains are to be found here. The highest of them, Mount Mitchell, is 6,688 feet. There are no less than 24 peaks which are higher than Mount Washington in New Hampshire. The principal mountain ranges are the Blue Ridge and Great Smoky Range, but there are also, the Black Mountains and the Balsam. The general trend is from northeast to southwest.

Rivers.— The rivers of North Carolina are numerous, but they are navigable only to the falls, the old shore line of the ocean in the east, hence the grand total of near 3,500 miles (of which scarcely more than 400 miles is navigable) indicates a vast water power which marks out the future of this State as one of the greatest manufacturing States in the Union. Indeed it may be well doubted if there is another which equals it in water power. At the "narrows of the Yadkin" the river has a fall of 50 feet in a distance of two miles.

Sounds and Lakes.— Besides the two great sounds, Albemarle and Pamlico, there are smaller ones, Currituck, Croatan, Roanoke, Core and Bogue. There are many lakes, the largest being Alligator, Phelps, Mattamuskeet, Pungo and Waccamaw. The largest (Mattamuskeet) has an area of 100 square miles, and Lake Phelps is about half as large.

Capes and Bays.— From the shore line jut out Cape Hatteras and Cape Lookout, between which is Raleigh Bay. Lower is Cape Fear, between which and Cape Lookout lies Onslow Bay. South of Cape Fear is Long Bay. The ocean front of North Carolina is considered the most dangerous on the Atlantic seaboard.


WESTERN PART
OF
NORTH CAROLINA
Same Scale as Main Map
SOUTH CAROLINA
GEORGIA
TENNESSEE
VIRGINIA
Charlotte
Asheville
Winston-Salem
Greensboro
Statesville
Concord
Salisbury
Monroe
Wadesboro
Lexington
Thomasville
High Point
Hickory
Morganton
Lenoir
Wilkesboro
Boone
Yadkinville
Mocksville
Albemarle
Rockingham
Laurinburg
Lumberton
Fayetteville
Rockingham
Wilmington
Greenville
Kinston
New Bern
Morehead City
Beaufort
Jacksonville
Elizabethtown
Whiteville
Tabor City
Conway
Myrtle Beach
Murrell Inlet
Midway Inlet
North Inlet
Pamlico Sound
Albemarle Sound
Currituck Sound
Roanoke Rapids
Weldon
Halifax
Scotland Neck
Tarboro
Rocky Mount
Wilson
Smithfield
Goldsboro
Kinston
Danville
Martinsville
Reidsville
Eden
Leaksville
Spray
Draper
Mayodan
Madison
Stoneville
Walnut Cove
Pilot Mountain
Mount Airy
Elkin
Jonesville
Yadkin River
Pee Dee River
Catawba River
Broad River
Saluda River
Blue Ridge
Great Smoky Mts.
Unaka Mts.
Black Mts.
Roan Mt.
Grandfather Mt.
Linville Mts.
Brushy Mts.
Uwharrie Mts.
Pilot Mts.
Hanging Rock
Crowders Mt.
South Mts.
Kings Mt.
Cowpens
Gaffney
Spartanburg
Greenville
Anderson
Pickens
Walhalla
Seneca
Clemson
Easley
Greer
Landrum
Tryon
Saluda
Hendersonville
Brevard
Sylva
Cullowhee
Waynesville
Canton
Clyde
Maggie Valley
Cherokee
Bryson City
Andrews
Murphy
Hayesville
Franklin
Highlands
Cashiers
Sapphire
Lake Toxaway
Rosman
Pisgah Forest
Transylvania
Henderson
Polk
Rutherford
Cleveland
Lincoln
Gaston
Cabarrus
Stanly
Montgomery
Richmond
Anson
Union
Mecklenburg
Iredell
Alexander
Caldwell
Watauga
Ashe
Alleghany
Wilkes
Surry
Stokes
Rockingham
Caswell
Person
Granville
Vance
Warren
Halifax
Northampton
Bertie
Hertford
Gates
Chowan
Perquimans
Pasquotank
Camden
Currituck
Dare
Hyde
Tyrrell
Washington
Martin
Pitt
Greene
Lenoir
Jones
Craven
Carteret
Onslow
Pender
New Hanover
Brunswick
Columbus
Bladen
Robeson
Cumberland
Harnett
Johnston
Wayne
Sampson
Duplin
Hoke
Scotland
Moore
Lee
Chatham
Orange
Durham
Alamance
Guilford
Randolph
Davidson
Davie
Yadkin
Forsyth
Iredell
Rowan
Cabarrus
Union
Anson
Richmond
Montgomery
Stanly
Mecklenburg
Gaston
Lincoln
Cleveland
Rutherford
Polk
Henderson
Buncombe
Madison
Yancey
Mitchell
Avery
McDowell
Burke

NORTH CAROLINA
SCALE OF MILES
0 10 20 30 40 50 60 70
State Capital
County Seats
Places of 20,000 and over — CHARLOTTE
" " 10,000 to 20,000 — Asheville
" " 5,000 to 10,000 — Durham
" " 1,000 to 5,000 — Beaufort
Hammond's 8 x 11 Map of North Carolina
Copyright, 1964, by C.S. Hammond & Co., N.Y.
ATLANTIC OCEAN
PAMLICO SOUND
RALEIGH BAY
Long. 78° 30' West from Green.
Raleigh
Goldsboro
Wilmington
Southport
Henderson
Oxford
Roanoke R.
Cape Fear
Cape Lookout
Cape Hatteras
Ocracoke
Manteo
Kitty Hawk
Currituck L.H.
Corolla
Duck
Nags Head
Rodanthe
Salvo
Avon
Buxton
Hatteras
Frying Pan Shoal Light Ship
New Inlet
Federal Pt.
Masonboro Inlet
Bogue Inlet
New R.Inlet
Stump Inlet
Ocracoke Inlet
Hatteras Inlet
Oregon Inlet
Currituck Sd.
Albemarle Sd.
Croatan Sd.
Roanoke Sd.
Core Sd.
Pamlico Sd.
Bogue Sd.
Back Bay
False Cape
Knotts Id.
Currituck
Poplar Branch
Jarvisburg
Harbinger
Powells Pt.
Kitty Hawk
Kill Devil Hills
Nags Head
Manteo
Wanchese
Roanoke Id.
Bodie I.
Bodie L.H.
Oregon Inlet
Rodanthe
Salvo
Avon
Buxton
Hatteras
Hatteras L.H.
Ocracoke
Ocracoke Inlet
Portsmouth
Core Banks
Shackleford Banks
Bogue Banks
Emerald Isle
Atlantic Beach
Fort Macon
Beaufort
Morehead City
Cape Lookout
Cape Lookout L.H.
Harkers Island
Core Creek
Newport
Newport R.
White Oak R.
Bear Pt.
Bluff Pt.
Great Island
Swanquarter
Swanquarter Bay
Lake Mattamuskeet
Pungo L.
Alligator L.
Pungo R.
Pamlico R.
Pamlico Pt.
Bay Pt.
Maw Pt.
Marsh Pt.
Cedar Bay
Lupton
Atlantic
Merrimon
Harlowe
Stacy
Davis
Marshallberg
Straits
Wildwood
Sea Level
Smyrna
Core Sd.
Core Creek
Newport
Newport R.
White Oak R.
Bear Pt.
Bluff Pt.
Great Island
Swanquarter
Swanquarter Bay
Lake Mattamuskeet
Pungo L.
Alligator L.
Pungo R.
Pamlico R.
Pamlico Pt.
Bay Pt.
Maw Pt.
Marsh Pt.
Cedar Bay
Lupton
Atlantic
Merrimon
Harlowe
Stacy
Davis
Marshallberg
Straits
Wildwood
Sea Level
Smyrna
Core Sd.
Core Creek
Newport
Newport R.
White Oak R.
Bear Pt.
Bluff Pt.
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Swanquarter
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Cedar Bay
Lupton
Atlantic
Merrimon
Harlowe
Stacy
Davis
Marshallberg
Straits
Wildwood
Sea Level
Smyrna

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Islands.— Roanoke Island between Albemarle and Pamlico sounds is the largest in the State and has an area of about 25 square miles. This island was the scene of the first English settlement on this continent, in July 1585. Here also was born the first child of the English race on this continent, Virginia Dare, 18 Aug. 1587. This colony made under the auspices of Sir Walter Raleigh (in whose honor the capital of the State is named) was soon abandoned. Cedar Island is nearly as large. Smith's Island at the mouth of the Cape Fear has nearly 15 square miles.

Climate and Rainfall.— The mean temperature is 59 degrees or about the average temperature of the Northern hemisphere. The State is on the same isothermal line as middle California, southern France and northern Italy. The rainfall is 60 inches for the eastern belt, 45 inches for the central and 58 inches for the western.

Geology.— The Eastern Division is covered with a stratum 50 to 300 feet thick of Tertiary sands and clays. It shows numerous marl deposits and phosphate beds. Through the Central part of the State is a three foot seam of triassic, not carboniferous, coal which is estimated to cover 70 square miles. The Western part of the State shows azoic formations only.

Soil.— The soil of the eastern division is generally sandy. Along the rivers are extensive bottom lands of clayey loam, which are very fertile, while the swamp lands have a deep, peaty black soil, and when drained are exceedingly fertile. In the central and western divisions the soil is clay, and gravelly or sandy loam.

Agricultural Products.— North Carolina is the only State that fills every blank in the Census of farm products, yielding all the crops grown in both the northern and southern sections of the Union. Its greatest crops, however, are corn, cotton and tobacco. Cotton is grown in the Eastern Division and in the southern half of the Central Division. The yield in 1902 was 550,000 bales, four times the quantity produced by this State in 1861, being the largest percentage of increase shown by any State since the Civil War, save Texas. In tobacco production North Carolina is second only to Virginia and the area has been steadily increasing. Nine tenths of the tobacco known in the markets of the world as "Virginia Brights" is grown in North Carolina. Corn is grown in every county. Rice is produced in large quantities in the Eastern Division and in the production of sweet potatoes the State stands first. In the last few years there has sprung up a great trucking industry, which extends from Currituck to Brunswick. Grape culture has largely increased of late years and no small quantity of wine is produced and shipped.

Timber.— The extent and value of the forests are especially noteworthy ranging from the palmetto, magnolia and live oak around Wilmington to the fir, hemlock and white pine in the mountains of the west. The vast quantities of pine and cypress, and of hardwoods specially oak, hickory, ash, walnut and gum have not only attracted saw mills but have created large furniture factories at High Point and at other places. Of the various species of trees found in the States east of the Rocky Mountains all the eight varieties of pine, the seven varieties of magnolia, the five varieties of maple, and both varieties of walnut are found in North Carolina, while it produces 19 out of the 20 varieties of oak, four out of the five varieties of spruce, three each out of the five varieties of elm and birch respectively and six of the eight varieties of hickory. Immense quantities of turpentine, rosin, tar and pitch are also produced from the vast tracts of pine forests.

Fauna.— Deer, red and gray foxes, raccoons, squirrels, opossums and rabbits are numerous, while wolves, bear, wildcats, beavers and others are still to be found. Swan, geese, brant and wild duck swarm in the sounds, bays, and rivers of the east in the cold months, while in all parts of the State quail, woodcock, snipe, doves and wild pigeons, larks, and many other birds are numerous. The attraction to sportsmen has been so great that a close season for game has been enacted by the legislature, and recently an Audubon Society has been authorized by the legislature for the protection of birds.

Fisheries.— More than 12,000 men are employed in the fisheries on the sounds and at the mouths of the rivers. More than $1,500,000 capital is invested. The shad and herring fisheries are especially valuable. Many of the seines are from a mile to three miles long and are operated by steam power. There are 26 counties interested in this industry, the principal ones being Currituck, Pasquotank, Chowan, Bertie, Beaufort, Dare, Pamlico, Craven, Carteret, Onslow, New Hanover and Brunswick. Herring are mostly cured in salt and shipped in barrels, but the shad, striped bass, chub, perch, and other fish are shipped on ice, the large fisheries having each its own ice factory. The State in 1876 organized its fish commission, establishing fish hatcheries which largely increased the catch of fish. Of recent years the United States government has taken over this work and has a shad and herring hatchery at Edenton and a similar establishment for rock bass and salmon at Weldon, at the falls of Roanoke River. The young fish thus hatched are set free in all the principal rivers and waters of the State and in other States, some being shipped even to the rivers of the Pacific coast. The oyster and shell fish industry in the eastern waters are also of great value. The State has an Oyster and Shellfish Commission which owns a steamboat and has many agents to encourage and protect this industry. The oysters are of fine quality, those of New River being especially prized. Diamondback terrapins and turtles are found all along the coast and are shipped north and inland, as are also large quantities of clams.

Navigation.— Vessels drawing 24 feet can ascend the Cape Fear River 30 miles to Wilmington, while the river is navigable 120 miles further to Fayetteville, to which point the Federal government contemplates deepening the channel to 8 feet. Th Roanoke is navigable 130 miles to Weldon, the Tar and the Neuse about 100 miles each and the Chowan for 75 miles. Two canals connect the Albemarle and Pamlico Sounds with Chesapeake Bay, and Congress has before it a bill to establish an inland water-way along the whole front of the State by deepening the sounds which lie behind the sand banks which fringe the seaboard.

Manufactures.— The water power of the

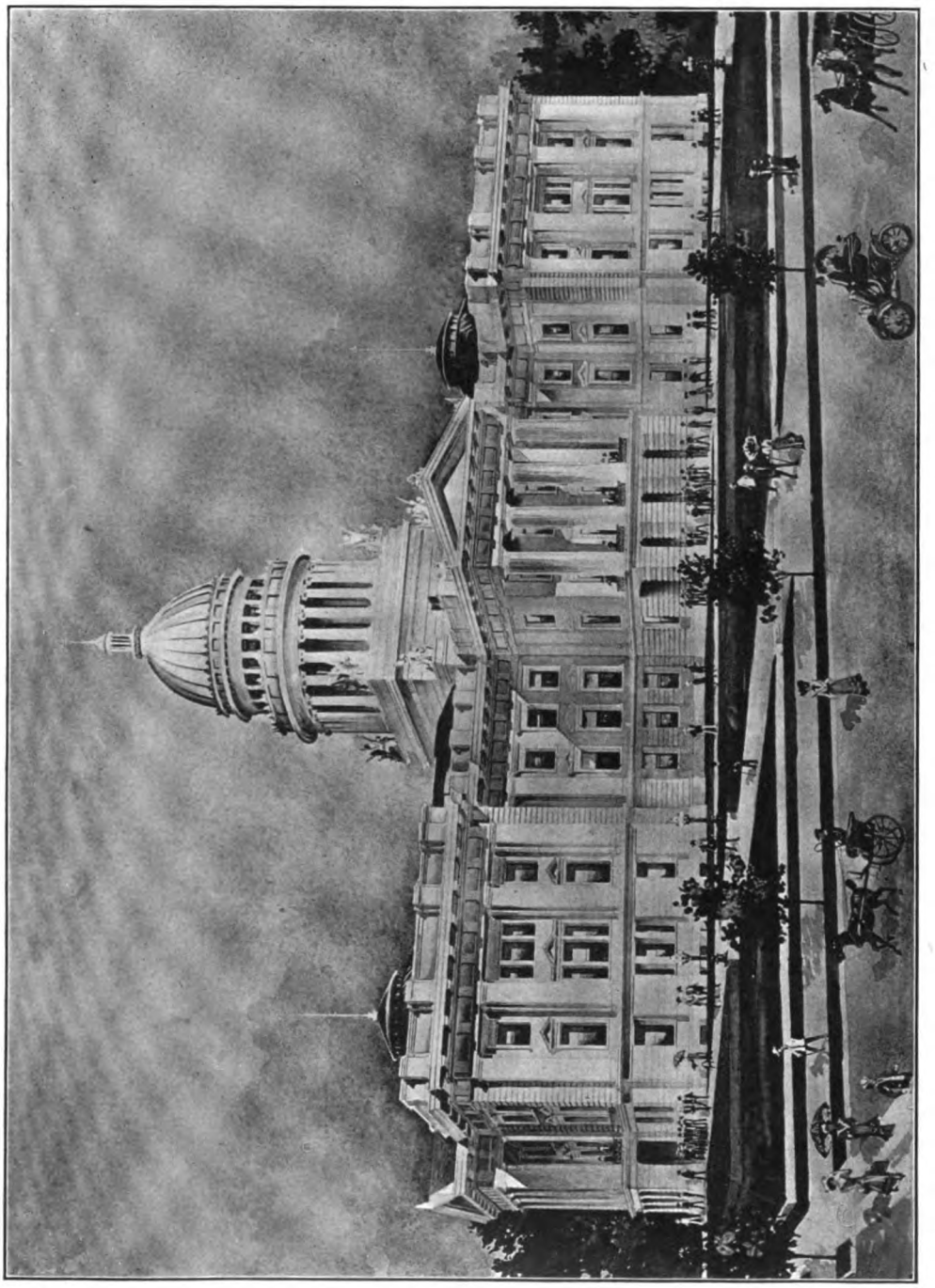
State owing to the great non-navigable length of its rivers and streams is very great, in fact more than twice enough to manufacture the entire cotton crop of the South. Already the State has more cotton factories than any other in the South and is a large manufacturer of tobacco. Other factories of all kinds have greatly increased in number. There are over 50,000 persons employed in tobacco manufacturing and over 40,000 in the cotton factories. Child labor under 12 years of age is forbidden by law in factories of all kinds. The chief manufactories of tobacco are to be found at Durham, Winston, Reidsville, and Henderson. There are also cotton factories at those points and at Charlotte, Raleigh, Concord, Salisbury, Fayetteville and at other towns as well as at many points on the streams remote from towns, especially in Alamance and Gaston counties, which counties have the largest number of cotton factories of any in the State.

Minerals.— The State has areas of coal, copper, gold, mica, iron, corundum, kaolin and marl. The last is to be found only in the eastern part of the State, the others in the centre and west. Silver, lead, zinc, zircon, graphite and manganese are also found. The deposits of iron are widely distributed over the State, the most abundant kind being the magnetic. The Cranberry iron mine in Mitchell County yields an ore unsurpassed in the world. There are two bituminous coal fields — one in Chatham and Moore counties and the other in Stokes and Rockingham. Both are in close proximity to extensive deposits of iron. Gold is found in 29 counties, mostly in the centre and west of the State, and more than 40 mines are being worked. Up to the discovery of gold in California, North Carolina was the largest gold producing State in the Union; the total yield up to date has been about $30,000,000. Tin has been found in Cleveland County. At one time three fourths of all the mica in the world was mined in this State and largely in Mitchell County. It is of a superior quality and plates three and four feet across are not unusual. Beautiful marble underlies large sections of Cherokee and Clay counties in the extreme west. Granite, sandstone, and porphyry are to be met with in large quantities, and superior stone for grist mills is quarried in Moore County. Near Wilmington are valuable phosphate beds. The State produces more corundum than any other locality in the world and of the best quality. The valuable gems, diamonds, emeralds, rubies, garnets, amethysts, opals, agates and hiddenites are found. A fine exhibition of minerals, gems, marbles and stones of all kinds is to be seen in the Museum of the State Agricultural Department at Raleigh. At Dunn's Mountain near Salisbury is an exhaustless supply of granite almost as white as marble, and at Mount Airy is an equally large quarry of light gray granite. Near Raleigh is the granite quarry from which the material for the State Capitol was taken. Indeed granite quarries of good quality are to be found in most of the counties and sandstone quarries are numerous. Mineral springs are numerous, the most noted being the Panacea Springs in Halifax County and the Seven Springs in Wayne in the east, while in the centre and west are the Hot Springs in Madison, the Sulphur Springs in Jackson, the Glen Alpine and Connelly Springs in Burke, the Vade Mecum Springs in Surry, the Lithia Springs in Lincoln, Cleveland Springs in the county of that name, Jackson Springs in Moore, and there are many others. Among natural objects of interest are Mount Mitchell, the highest peak on this continent east of the Rocky Mountains; Linnville and Cullasaja Falls; Hickory Nut Gap and the adjacent Chimney Rock; Table Rock and Paint Rock.

Railroads.— There are now about 3,800 miles of railroad in operation and several hundred miles more under contract or in contemplation. There are street railways in all the larger towns and a few miles of rural trolley lines with many more proposed. The three principal railway systems are the "Southern" tne "Seabord Air Line" and the "Atlantic Coast Line." The railroads are valued for taxation at $70,000,000, but this is much less than half their true value, as they were returned in the census of 1890 as then worth $151,000,000.

Government.— The present constitution, adopted in 1868, amended by a convention in 1875 and by several amendments submitted by legislatures since and ratified by the people, provides for an executive department consisting of a governor (not re-eligible), a lieutenant-governor, secretary of state, treasurer, auditor, superintendent of public instruction, commissioner of agriculture and commissioner of labor, all elected by the people for four years. There is also a commissioner of insurance elected by the legislature, and a corporation commission of three members elected by the people for a term of six years. The legislative department consists of 50 senators and 120 members of the house of representatives elected by the people every two years. The judicial department consists of a supreme court composed of a chief justice and four associates chosen by the people for eight years and 16 superior court judges, who are chosen for the like period by the people and who ride in rotation each of the 16 superior court districts into which the State is divided.

Education.—North Carolina was the second State to establish a State University, which it did in 1789 at Chapel Hill. It has now also the State Agricultural and Mechanical College at Raleigh and a State College for Women at Greensboro. These three constitute a complete system of higher education by the State. There is also a State Agricultural and Mechanical College for the colored at Greensboro. There are also many sectarian colleges, of which the Baptists have one at Wake Forest, the Presbyterians at Davidson, the Methodists at Durham, and there are others. There are also several colleges for women, and three colleges for the colored people. As early as 1825, the State provided a public school fund and in 1840 established a public school system. This now provides instruction in primary and intermediate grades, free of charge, to all children between the ages of 6 and 20. There is an annual appropriation for normal institutes for the instruction of both white and colored teachers. The public school system supported by State appropriations is supplemented by graded schools for free education maintained in all the larger towns by local appropriations. The public funds for education are divided between the



DESIGN FOR NEW STATE CAPITOL AT RALEIGH.

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whites and blacks per capita. Besides the State Library of 40,000 volumes, and the Law Library of the Supreme Court of 20,000 volumes, both at Raleigh, several towns have public libraries and the University and all the colleges maintain libraries. The State has also established libraries for the public schools in the rural districts.

Penal and Charitable Institutions.—The State has established a penitentiary at Raleigh, three insane asylums — one at Goldsboro for the colored people, the other two for the whites at Raleigh and Morganton. There is an Institute for Deaf Mutes for the whites at Morganton and one for the colored deaf, dumb and blind at Raleigh and an Institute for the Blind for the whites also at Raleigh.

Counties.—There are 97 counties, of which Robeson is the largest and New Hanover the smallest. Wake has the largest population and Graham the smallest. There are railroads in all the counties except seven.

Cities.—The principal towns are Wilmington, the chief seaport, 30 miles above the mouth of the Cape Fear, up to which vessels can come drawing 24 feet; Raleigh, the State capital, named in honor of Sir Walter Raleigh; Charlotte, Greensboro, Salisbury, Statesville, and Winston in the central part of the State; Asheville, Waynesville and Morganton in the west, and Fayetteville, Goldsboro, Washington, Elizabeth City, New Bern and Beaufort in the east, the last four being like Wilmington, seaport towns.

Colonies.—There is a growing stream of immigration from the North, which in some instances has taken the form of colonies, the most successful and prosperous of which is at Southern Pines in Moore County. This State has the smallest per cent of foreign population in the Union, and indeed irrespective of percentage the smallest foreign population of any State.

Population.—By the census of 1900 North Carolina had a population of 1,893,810; of which 1,263,603 were whites; 624,469 were negroes; 5,687 Indians and 51 Chinese. There were 938,677 males and 955,133 females. There were something more than two whites to every negro. The bulk of the negro population is in the eastern division and the southern half of the central division. There are very few negroes in the mountain country which constitutes the western division.

History.—The coast of North America was first seen by John Cabot in 1497, and 87 years later the first attempt by the English to establish a colony on this continent was made by Sir Walter Raleigh, whose exploring expedition of two ships arrived at Wokoken Inlet on the coast of North Carolina 4 July 1584. This expedition landed at Roanoke Island and carried back two savages, Wanchese and Manteo. The next year Raleigh sent out a fleet of seven ships under Sir Richard Grenville which settled 108 colonists on the Island under Gov. Ralph Lane. Falling into straits for want of food, these colonists were taken home in June 1586 by Sir Francis Drake, who was returning with his fleet from a raid upon the Spaniards in the West Indies. Soon after they left, Sir John Grenville arrived with relief, but not finding the colony, left 15 men and returned home. In 1587, a new colony consisting of 89 men, 17 women and 2 children came out under Gov. John White. His daughter, the wife of Ananias Dare, on 18 Aug. 1587 gave birth at Roanoke Island to Virginia, the first child of English parentage born on this continent. Gov. White soon returned to England, but the Spanish Armada of 1588 prevented aid being sent to the colony till 1590, at which time the colony had disappeared and the fate of the "Lost colony of Roanoke" is one of the unsolved problems of history. The next settlement by the English was made at Jamestown, Va., in 1607. In 1629 a grant of Carolina was made to Sir Robert Heath and an abortive attempt at settlement was made in 1639. Gradually scattering settlers came into the Albemarle and Pamlico region from Virginia, and in 1660 a New England colony bought land from the Indians and settled near the mouth of the Cape Fear. They soon left, but were succeeded in 1663 by a colony from Barbados under Sir John Yeamans, who repurchased the land from the Indians. This settlement was abandoned in 1690. On 24 March 1663 Charles II. granted to the Duke of Albemarle (the restorer of the monarchy) and seven others, as Lord Proprietors, all the country between the Atlantic and Pacific Oceans and between latitudes 36° and 31°, and William Drummond was appointed Governor. In 1665, a second charter to the same Lord Proprietors was granted, extending the limits to lat. 36° 30′ on the north. The first legislature was held in 1665. In 1669 the "Fundamental Constitutions of Carolina" drawn up by the famous John Locke were adopted by the Lords Proprietors and were sent out to the colony. They proved too elaborate and cumbersome for the handful of pioneers, residing mostly in the northeast of the province, on Albemarle Sound, and after a nominal existence they were repealed in 1693. Twenty proprietary governors followed in rapid succession. For the most part, save Drummond and Archdale, they were very unfit, and often unworthy men. The sturdy colony deposed six of them and sent them back. One (Sothel) they put into prison and forced him to take an oath of abdication. In 1677 under Gov. Culpeper there was open rebellion on account of undue taxation on tobacco and interference with trade regulations. Again in 1708 under Thomas Carey there was a rebellion on account of the taxation of Quakers and Dissenters for the support of the Established Church. For more than two years there was no government of any kind in force, the farmers attending to their crops and "doing and saying what they list." In 1691 was adopted a system of having one governor for Carolina with a lieutenant-governor each for Albemarle and Charleston, the two principal settlements. In 1708, Bath was incorporated as the first town. In 1710, Gov. Hyde, a cousin of Queen Anne, came out as the first governor of North Carolina. On 20 Sept. 1711 the Tuscarora Indians, by preconcert, fell upon and massacred the settlers on the Roanoke, Neuse and Pamlico. The war lasted two years, but with the aid of troops from South Carolina the power of the Indians was broken with the capture of their fort at Nahucke in the spring of 1713. In 1718, Edward Teach, commonly known as "Blackbeard," the leader of the pirates who had troubled the colony, was killed in a sea fight off Bath, which put an end to piratical depredations. In 1728

the long boundary dispute with Virginia was settled, the line being surveyed to the foot of the mountains. In the same year seven of the lord proprietors sold out their interest to the crown for $87,500. Earl Granville retained his one eighth which was set off to him as a strip of land, 70 miles wide, next to the Virginia boundary, though he surrendered all right to share in the government. At this time there were three counties, Albemarle, Bath and Clarendon, divided into eight precincts. In 1729 the above counties were abolished, the precincts becoming counties, and the colony being definitively divided into North Carolina and South Carolina. The population of North Carolina was then about 40,000. The Royal government thus established continued until the Revolution. There were five Royal governors, George Burrington 1729–34; Gabriel Johnston 1734–1752; Arthur Dobbs 1754–1765; William Tryon 1765–71; Josiah Martin 1771–75. During this period immigration came in rapidly, mostly from Virginia and Pennsylvania, so that at the outbreak of the Revolution the population had risen to 300,000 and there were settlements to the mountains and beyond. There were Scotch settlements made after Culloden on the Cape Fear. Germans and Moravians came in by way of Pennsylvania, from which also and from Charleston came many Scotch-Irish. In 1740 the Province sent a battalion to join the English expedition against Carthagena in South America. In 1749 the first printing-press was set up. The first book was printed in 1752 and a crude postal service was established in 1755. In 1758 the colony set a regiment under Col. James Innes to Winchester, Va., to take part in the war against the French and Indians, and soon after sent other troops under Hugh Waddell against the Cherokees in the west of the province. The colony openly resisted the Stamp Act and on 16 Nov. 1765 forced the stamp master, William Houston, to resign his office and to swear not to receive the stamps. In February 1766 under the leadership of Hugh Waddell and John Ashe the inhabitants of Wilmington, without using any disguise, boarded the Viper, sloop of war, and demanded and obtained the release of certain merchant vessels which had been seized on account of failure to observe the Stamp Act. A few days later 700 armed militia surrounded the house of Gov. Tryon and took therefrom in his presence the comptroller of the province and forced him to do what Houston had done. In 1765 an agitation began against the exaction of exorbitant official fees, and poll-tax, which culminated in open war, known as the Regulators War, in which the insurgents were crushed by Gov. Tryon at the battle of the Alamance 16 May 1771. This was really the first bloodshed in the Revolution. In August 1774 a Provincial Congress was held in New Bern in defiance of Gov. Martin's prohibition, which elected delegates to the Continental Congress. In Edenton 51 women held the famous "Tea Party," subscribing to a paper to boycott the use of East India tea and to abide by the action of the Provincial Congress. Patriotic meetings were held in many counties. Soon after the receipt of the news of Lexington and Concord, the people of Charlotte assembled, 20 May 1775, and declared the country independent of Great Britain and by special mesenger sent a copy of their proceedings to the Continental Congress. This was the first declaration of the kind in America. In honor of this event, "20 May 1775" is borne on the State seal. Gov. Martin fled from New Bern 14 June 1775 and took refuge on a British man of war. On 12 April 1776 the new State instructed its representatives in the Continental Congress to vote for independence, being the first State to do this. A free Constitution was adopted in that year. The first victory for the patriot cause was that gained by the North Carolina militia at Moore's Creek 27 Feb. 1776. The State furnished ten regiments of "Continental" Regulars and many thousands of militia for shorter "tours of duty." In 1780–1 the State was invaded by Cornwallis. On 7 Oct. 1780 a most damaging blow was inflicted on him by the destruction of Ferguson and his detachment at King's Mountain, the bulk of his assailants being from North Carolina and Tennessee (then a part of North Carolina). On 15 March 1781 was fought the battle of Guilford Court House. The Americans under Greene retired, but the result was a practical defeat for Cornwallis, who fell back to Wilmington, whence he marched to his fate at Yorktown. North Carolina was represented in the Federal Constitutional Convention at Philadelphia in 1787, but it was the last State but one to ratify the Constitution, which it did not do till assured for the adoption of the first ten amendments to that instrument. It rejected the United Constitution in 1788, but ratified it in November 1789. Thus it did not participate in the first election for President. At the first census, 1790, it was the third State in point of population (391,000), coming after Virginia and Pennsylvania only, and ahead of New York and Massachusetts.

One of the first acts of the State as a member of the Union was the cession of Tennessee, which was accepted by the United States 2 April 1790. The permanent capital was located at Raleigh by statute in 1701. There soon set in a tide of emigration to Tennessee, then to other Southern and Western States, so that North Carolina which in 1790 ranked third in population was only eleventh in 1840. This tide showed no slackening until after 1850. In the War of 1812 the State furnished nine regiments, two of which went to Norfolk, and one to Jackson's aid in the Creek war. Capt. Johnson Blakely of Wilmington commanded the United States sloop Wasp and destroyed many English ships. Among its many privateersmen who preyed on the enemy's commerce Capt. Otway Burns was the most famous. In the Mexican War the State sent a regiment and two companies.

North Carolina was the next to the last State to enter the Federal Union in 1789 and she was the next to the last to leave it in 1861. The State voted against Secession in February of that year, but when President Lincoln called for troops to coerce the seceding States and Virginia had seceded, North Carolina on 20 May 1861 followed her example. The die was cast, she did her full duty to the cause she had espoused. With a voting population (white) of 112,000 in 1861 she sent over 127,000 men to the Confederate armies. Some 5,000 or more (whites and blacks) joined the Union forces.

The first man killed on the Southern side in battle was a soldier from this State, and historians claim that the dead left nearest the enemies' lines at the pivotal battles of Gettysburg and Chickamauga were North Carolina's sons, and they fired the last volley at Appomattox. The captures of Fort Hatteras, Fort Fisher, of Plymouth, the battle of Bentonville 19–20 March 1865, and the surrender of Joseph E. Johnston 26 April 1865 were the most notable events of the war which took place on her soil. Wilmington was famous as a port for blockade running and was the last to be closed. Her war governor was Zebulon B. Vance, afterward for many terms United States Senator. The State lost 42,000 killed and wounded, or about one third of the troops she furnished to the Confederacy. In 1868 began the era of Reconstruction, when the blacks were first allowed to vote and the "carpet bag" rule began. The Ku-klux Klan (q.v.) was organized as a protest against this in 1869, and the State was in a turmoil until the whites regained full control of the government. In 1870 Gov. Holden was impeached and removed from office. The State has grown rapidly in population and development since the war. In 1894 and 1896 the Populist and Republican parties combined and carried the State. In 1898 the State again became Democratic and the General Assembly submitted a Constitutional Amendment disfranchising the uneducated negroes, which was ratified by the people in 1900.

WALTER CLARK,
Chief Justice Supreme Court of North Carolina.

North Carolina College of Agriculture and Mechanic Arts, founded in 1889 at West Raleigh. Four years' courses are offered in agriculture, civil, mechanical, electrical, and chemical engineering, textile work, cotton manufacturing, and dyeing; the degrees conferred for the completion of these courses are bachelor of agriculture and bachelor of engineering; there are also graduate courses, two years' courses in agriculture, mechanic arts, and cotton manufacturing, and twelve weeks' courses in agriculture, carpentry, machine shop work, engine and boiler tending, and machine drawing and designing. The experiment station is also connected with the college, and receives an annual Federal appropriation. The college controls the national land grant of 1862, and also receives State and Federal appropriations; in 1903 the income amounted to $95,000. The library contained 4,000 volumes; the students numbered 500, and the faculty 35.

North Carolina, University of, the State University chartered in 1789 and opened in 1795, situated at Chapel Hill. Its organization includes a collegiate department, a law school (established 1846), a medical school (1891), a school of pharmacy (1897), and a department of mining (1901); there are also post-graduate courses, and a summer course intended primarily for teachers. The work in the collegiate department is almost entirely elective in the last two years, and leads to the degrees of A.B., B.S., and Ph.B.; the corresponding masters' degrees, and Ph.D. are conferred for post-graduate work; the medical school has only a two years' course and does not confer a degree, but its certificate admits to all other medical schools. Women are admitted to the university, but form only a small proportion of the students. The charge for tuition is small, and instruction is given free to students who are graduates of universities and colleges; there are also a number of scholarships, and a loan fund has been established for the aid of poor students. The campus contains 48 acres, and the grounds and buildings were valued at $500,000 in 1903; the income in the same year amounted to $78,000. The general library numbered 33,000 volumes; and there are also several departmental libraries; the number of students was 651, and of professors and instructors, 69.

North Dakota, da-kō'ta, a northwestern State (No. 26 in the Union), abutting on Canada (Assiniboia and Manitoba), and bounded south by South Dakota, east by Minnesota, and west by Montana. It extends 360 miles east and west and 210 north and south. Area, 70,795 square miles, of which 600 is water. Capital, Bismarck. Pop. (1903, est.) 360,000.

The State is part of the great prairie region, extending far into Canada. Its surface is mostly level or gently rolling. The only tract of considerable elevation as a whole is the Turtle Mountain district in the north centre, about 20 by 40 miles in length, a small part in Canada,—a district of low hills, whose highest points are Butte St. Paul, 2,500 feet, and Bear Butte, 2,400 feet. A great number of isolated buttes, with some short ranges of hills, are scattered through the southwestern portion beyond the Missouri. The generally even surface of the State renders it best classified by the valleys and watersheds of its rivers: (1) The Red River of the North, forming its entire eastern boundary, flows into Lake Winnipeg, through a valley of rich bottom land 50 to 60 miles wide, elevated beyond the reach of overflows, and rising in the north to the Pembina highlands. The chief affluents are the Sheyenne in the south, the Goose in the centre, and the Pembina in the north. (2) The Dakota or James River (French, "Rivière de Jacques"), in the south, is half way between the Red and the Missouri. This is the longest unnavigable river in the world and flows (600 miles) from the central plateau through South Dakota into the Missouri. Its valley is one of the most noted artesian districts on the globe, being underlaid by the Dakota sandstone, a great water-bearing stratum which occupies a large part of the State. (3) The Mouse or Souris River in the north, west of the centre, flowing south by east down from Canada, sweeping around in a great loop and then running north into Canada again, joining the Assiniboine. It is noted for its valuable coal deposits and stock ranges. (4) The Missouri has a navigable course of about 300 miles in the State. Its *coteau* or plateau, a stony upland separating its bed from that of the Dakota, extends in a huge curve through the centre of the State and is dotted with small alkaline lakes. (5) The southwestern triangle beyond is a country of broad semi-arid valleys and scattered buttes. It contains two main watersheds lying at right angles to each other: the Little Missouri, running north and south in the extreme west for 150 miles, then turning east for another hundred to join the Missouri, and those of the Cannon Ball, Heart and Knife, which flow into the Missouri from the west. The Missouri has no considerable affluent from the east within the State. At

the extreme west, north of the centre, the Yellowstone runs its last few miles in the State before joining the Missouri. Up and down the centre are hundreds of small lakes. In the northwest are one or two larger ones, but the one great group is northeast of the centre, its chief member being Devil's Lake (Indian, Minnewaukan), a wildly irregular body of salt water some 50 miles long by 1 to 12 wide, about 400 square miles in area, 1,467 feet above the sea, and with no visible outlet. Hurricane Lake and Lake Irwin drain into it. North and east lie the Sweetwater Lakes and Stump Lake.

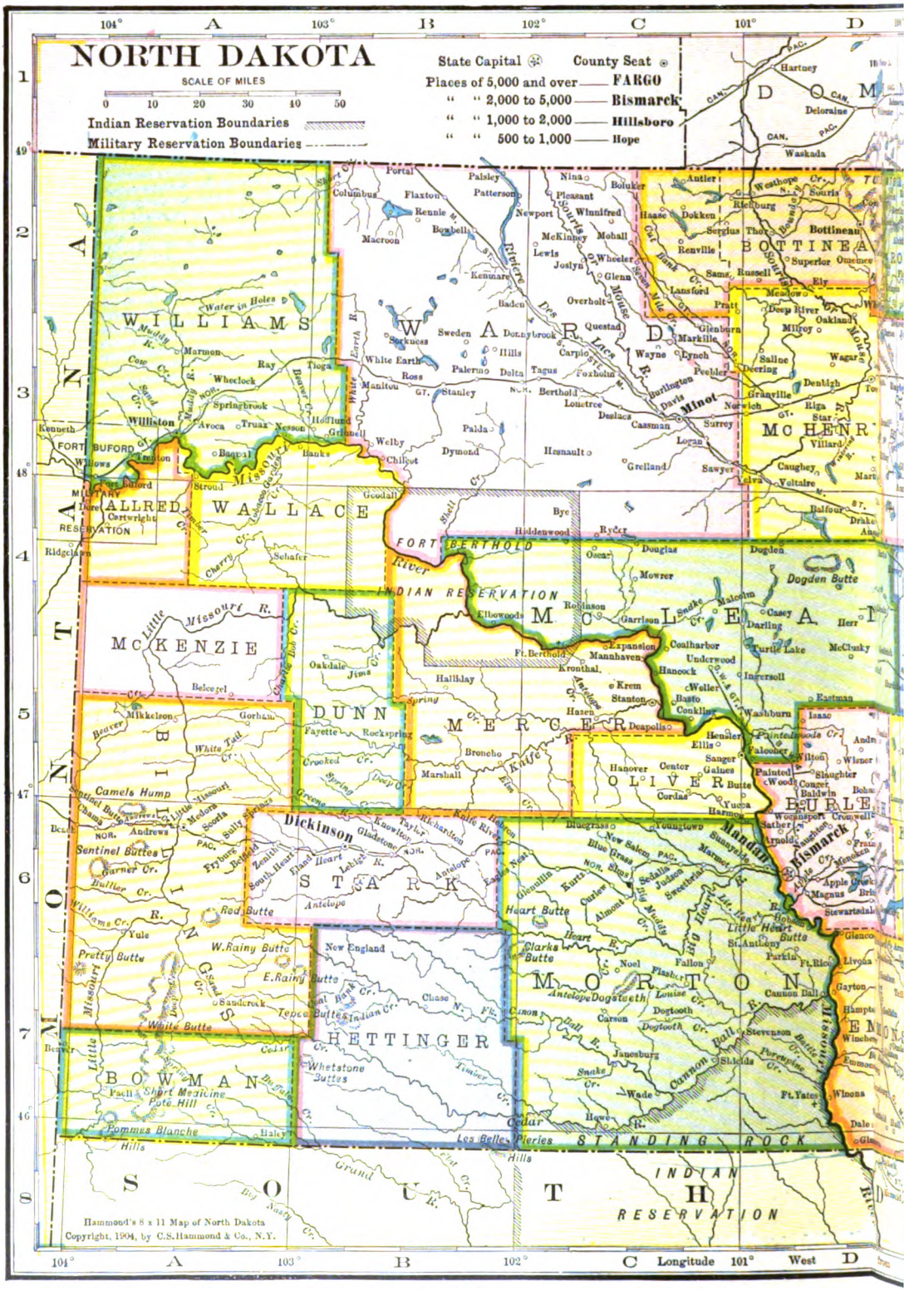
Geology and Minerals.— The entire surface of the State has been worn by glacial action and having been afterward repeatedly submerged, is covered with the mud of extinct lakes. One of these was the vast Lake Agassiz (q.v.), larger than all the Great Lakes together, of which the Red River Valley forms a part. The southwestern triangle of the State is entirely underlaid with lignite or half-made coal (the soft coal of Germany), which is so abundant that the farmers often dig their own supplies from the hillsides. The fuel is also to be found in quantities sufficient to be of economic importance throughout the entire portion of the State which lies west of the hundredth parallel. Lignite is a free burner, and an excellent gas coal, but has been thought too light for the strong drafts of locomotives. The coal famine of 1902, however, stimulated invention, patterns in stoves have made it available and satisfactory for household purposes, and the process of briquetting promises well to remove most of the objections to it for locomotive uses. Many new mines have been recently opened, and there are now 43 in the State. The cheap power to be derived from this source is expected to make large irrigation works possible and is largely relied upon, not only by those interested in local and private irrigation but by those entrusted with the expenditure and use of the moneys, now amounting to nearly $3,000,000, apportioned to the State as its share of the national irrigation or "reclamation fund." The production of lignite has risen from 38,997 tons in 1895, to 166,601 tons in 1900 and 296,800 tons in 1902. So also, although there is comparatively little building stone in the State, with the exception of some excellent qualities of sandstone to be found in the western portion and the granite boulders scattered throughout the glaciated area, the soil is rich in valuable clays. Not only is nearly all of the brick used in the State made within its borders, but a large and growing trade is carried on with the Canadian Northwest, and large quantities of high grade facing and firebrick are shipped throughout the West and Northwest of the United States. Pottery clays are also to be found in great abundance, while in the neighborhood of the Tongue River in Cavalier County are to be found rich deposits of argillaceous limestone which are being made into high grade Portland and natural hydraulic cements.

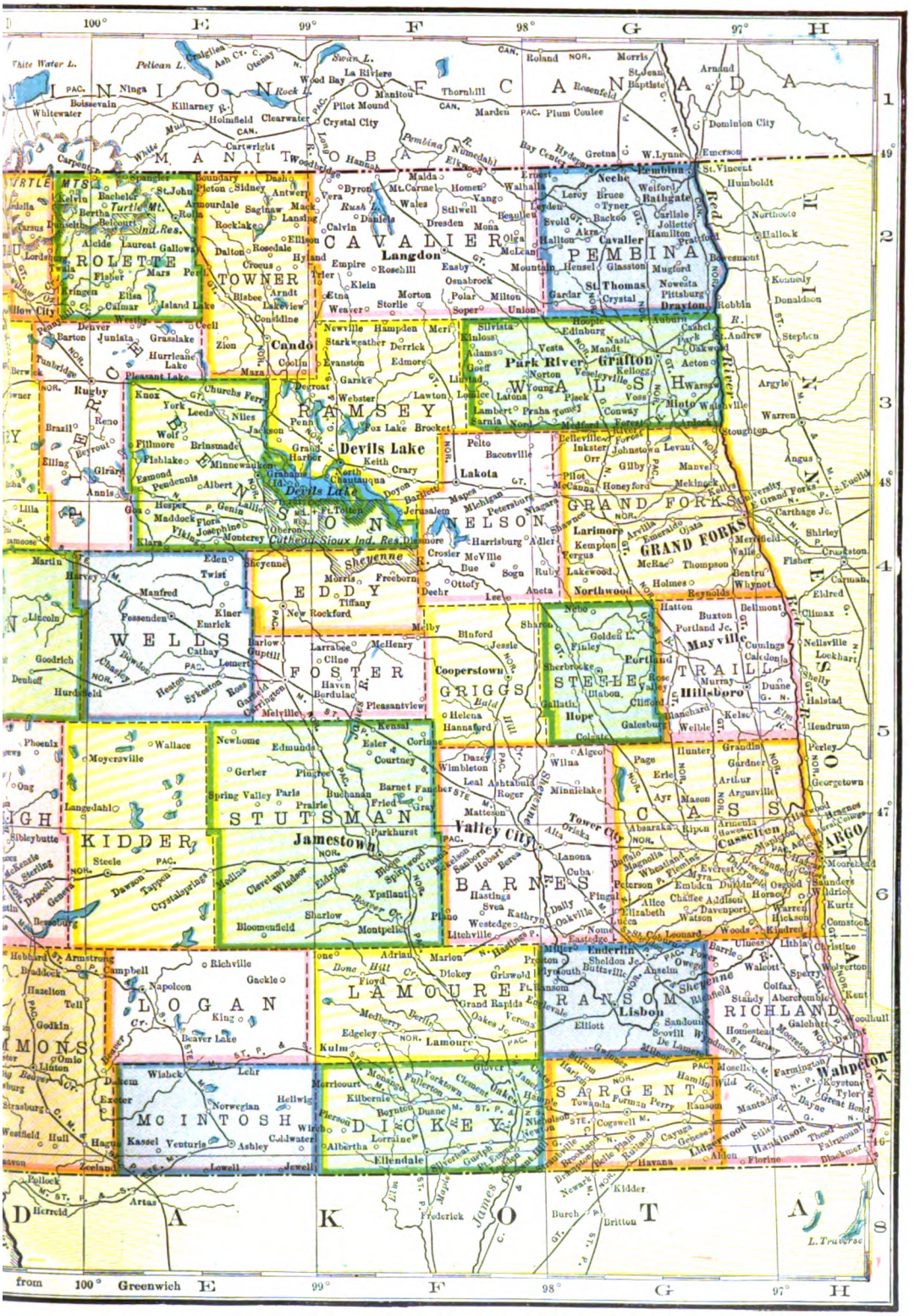
Flora and Fauna.— The forested area of the State is very small, mainly in the Pembina, Turtle Mountain, and Devil's Lake regions, where grow oak and ash, poplar and birch, willow and box-elder, plum and bull-cherry, and other deciduous trees. Along the Missouri are large cottonwoods. The characteristic wild animals are nearly all in the southwest, where are brown bears and a few grizzlies, timber and prairie wolves, panthers, and wildcats, besides gophers, prairie-dogs and deer. Trappers also find otter, mink, beaver, raccoon, and badger. Sportsmen shoot much grouse and prairie chicken, wild geese and wild ducks.

Climate and Rainfall.— The weather is severe in the winters, sometimes as low as —40°, but the very dry atmosphere — the precipitation during the winter not averaging over five inches — makes it less trying than damper climates with higher temperatures. The summer heat rises to about 95°. Spring usually begins in March. The rainfall steadily decreases from east to west, being about 20 inches in the Red River Valley and 10 at the Yellowstone. Three fourths of it falls in the growing season, April and August. The rain is sufficient for profitable farming for 100 miles west of the Red River; beyond that, the region is better suited to ranching. Irrigation is contemplated in the arid parts, and will greatly increase their agricultural development.

Soils and Agriculture.— The soil is by far the richest in the Red River Valley, a wonderful bottom-land, where the black rich top soil of decayed vegetation overlies alluvium and glacial drift to the depth of sometimes 300 feet, down to a clay which when near the surface is itself rich farming ground. The soil grows thinner to the westward on the plateau, and to the southwest. The great crop of North Dakota is wheat: the No. 1 hard spring wheat of the Scotch variety, which ranks as the foremost in the market and makes the best flour. In 1902 the crop was 62,872,241 bushels, valued at $36,465,900. Other cereals were grown in immense volume: oats, 29,437,402 bushels; barley, 15,861,557 bushels; corn, 1,604,380 bushels. The value of these four crops together was over $50,000,000. The next most important specialty to wheat is flaxseed, of which the State raises more than all the rest of the United States together: in 1902, 15,552,500 bushels, valued at $16,018,560. The crop of potatoes was about 2,500,000 bushels. The garden produce nearly doubled in 1901 from 1900. Small fruits and grasses also grow in abundance; but orchard fruits are not much raised. In 1902 the State had over half a million neat cattle, besides 166,665 milch cows, 827,781 sheep, and some 175,000 swine. The wool clip in 1902 was 3,030,470 pounds. The exports of hay were very large. There are still over 15,000,000 acres of unappropriated land in the State, besides 8,328,490 reserved, and the growth of the farming section has a large future before it.

Manufactures.— The State being a predominantly agricultural and cattle-raising one, the only considerable manufacturing industries which are not "neighborhood" manufactures, consumed near the point of production, are those of flour, potteries, and bricks. In 1900 there were 70 flour-mills, producing a value of $4,134,023, or 45 per cent of the total manufacturing product of the State; in 1902 there were 84. In 1902 there were eight cheese factories and 38 creameries, and 926,005 tons of feed were turned out. Fargo and Grand Forks were the chief centres of manufacture, producing over 35 per cent of the total value of products, and employing over 42 per cent of the wage-earners. There were in all 1,130 establishments, employing 2,398 hands, paying $1,222,472 in wages, and turning out a product valued at $9,183,114. The articles included, besides the grain products, harness and saddlery


NORTH DAKOTA
SCALE OF MILES
0 10 20 30 40 50
Indian Reservation Boundaries
Military Reservation Boundaries
State Capital
County Seat
Places of 5,000 and over — FARGO
" " 2,000 to 5,000 — Bismarck
" " 1,000 to 2,000 — Hillsboro
" " 500 to 1,000 — Hope
WILLIAMS
WARD
BOTTINEAU
McHENRY
ALLRED
WALLACE
McKENZIE
DUNN
MERCER
McLEAN
OLIVER
BURLEY
BILLINGS
STARK
MORTON
HETTINGER
BOWMAN
SOUTH
MONTANA
FORT BERTHOLD INDIAN RESERVATION
STANDING ROCK INDIAN RESERVATION
Williston
Minot
Dickinson
Mandan
Bismarck
Hammond's 8 x 11 Map of North Dakota
Copyright, 1904, by C.S.Hammond & Co., N.Y.
Longitude West


100°
99°
98°
97°
CANADA
UNION OF CANADA
MANITOBA
CAVALIER
PEMBINA
ROLETTE
TOWNER
RAMSEY
Devils Lake
Devils Lake Sioux Ind. Res.
Cuthead Sioux Ind. Res.
NELSON
GRAND FORKS
WALSH
PARK RIVER
GRAFTON
EDDY
WELLS
FOSTER
GRIGGS
STEELE
TRAILL
CASS
STUTSMAN
KIDDER
Jamestown
Valley City
BARNES
LAMOURE
LOGAN
RANSOM
Lisbon
RICHLAND
MCINTOSH
DICKEY
SARGENT
Wahpeton
Fargo
Grand Forks
Devils Lake
Jamestown
Valley City
Wahpeton
Fargo
Lisbon
Hillsboro
Larimore
Cooperstown
Carrington
Harvey
Rugby
Minot
Dickinson
Mandan
Bismarck
Wishek
Napoleon
Ellendale
Oakes
Lidgerwood
Casselton
Mayville
Portland
Northwood
Hatton
Reynolds
Thompson
Lakota
Pelto
Baconville
Michigan
Petersburg
Harrisburg
Adler
Crosier
McVille
Sheyenne
Morris
Freeborn
Ottoly
Deehr
Aneta
Sogn
Ruby
Lakewood
Vergus
McRae
Emerald
Ojata
Arville
Kempton
Larimore
Merrifield
Walle
Crandall
Carthage Jc.
Shirley
Fisher
Carman
Eldred
Climax
Nellsville
Lockhart
Halstad
Hendrum
Perley
Georgetown
Argusville
Arthur
Gardner
Grandin
Hunter
Erie
Page
Ayr
Mason
Absaraka
Ripon
Casselton
Arnegard
Howes
Magnolia
Buffalo
Wheatland
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Everest
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Peterson
Embden
Dudley
Davenport
Alice
Chaffee
Addison
Elizabeth
Watson
Woods
Kindred
Hickson
Comstock
Wildrick
Kurtz
Saunders
Osgood
Horace
Warren
Moorhead
Dilworth
Christine
Hickson
Lithia
Ulness
Walcott
Colfax
Wyndmere
Kent
Woodhull
Galchutt
Abercrombie
Staindy
Sperry
Barrie
Enderlin
Sheldon Jc.
Buttzville
Anselm
Owego
Sheyenne
Richfield
Dazey
Wimbleton
Leal
Ashtabula
Roger
Minnielake
Algeo
Wilna
Tower City
Oriska
Lanona
Cuba
Hastings
Sheldon
Fingal
Dally
Oakville
Sharlow
Montpelier
Litchville
Marion
Adrian
Hobart
Griswold
Dickey
Grand Rapids
Verona
Edgeley
Kulm
Lamoure
Merricourt
Kilbernie
Boynton
Duane
Lorraine
Albertha
Ellendale
Pierson
Cogswell
Forman
Perry
Ransom
Mantador
Rutland
Cayuga
Geneseo
Hankinson
Fairmount
Lidgerwood
Aldon
Florine
Blackmer
Havana
Kidder
Burch
Britton
Frederick
Artas
Herreid
Selfridge
Fort Yates
Solen
Cannonball
Porcupine
Bullhead
Mott
Regent
Scranton
Reeder
Hettinger
Lemmon
Bowman
Rhame
Marmarth
Amidon
Gascoyne
Haley
Bowdon
Medina
Dawson
Tappen
Crystal Springs
Steele
Driscoll
Sterling
Menoken
Wilton
Baldwin
Sibley
Butte
Gackle
Sanborn
Tuttle
Sykeston
Hurdsfield
Denhoff
Goodrich
Chaseley
Heaton
Lincoln
Martin
Manfred
Kiner
Emerick
Fessenden
Harvey
Eden
Twist
Shevenne
Phoenix
Wallace
Moyersville
Ong
Langdahl
Gerber
Pingree
Spring Valley
Paris
Prairie
Buchanan
Fried
Barnet
Fancher
Gray
Parkhurst
Bloomenfield
Sharlow
Montpelier
Litchville
Valley City
Jamestown
Cleveland
Windsor
Medina
Eldridge
Bloom
Sprague
Urban
Ypsilanti
Hastings
Sheldon
Fingal
Dally
Oakville
Sharlow
Montpelier
Litchville
Barnes
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Dazey
Wimbleton
Leal
Ashtabula
Roger
Minnielake
Algeo
Wilna
Tower City
Oriska
Lanona
Cuba

Uofm

(always important items in a ranching country), dairy products, brick and tile, pottery, fire-clay, and terra-cotta, fur and woolen goods, paper and tow, wire rope and cable and other wire work, carriages and wagons, car-shop work, furniture, lumber, timber, soda and mineral waters, tobacco, cigars, cement and binding-twine.

Banking.— All private banks have been compelled by a recent statute to take out charters as State banks. On 31 Oct. 1901, the number of national banks in operation was 36, their capital was $1,762,500, their outstanding circulation $783,676. There were also 143 state banks. The total deposits of the 176 banks (an increase of 38 within the year) were over $10,000,000; resources, $9,603,699.96; reserves, $13,437,076.88; loans and discounts, $8,482,721.64, an increase of nearly 50 per cent in the year. There were six building and loan associations, with over 2,000 members.

Transportation Lines.— The Missouri is navigable throughout its length in the State, but needs a clever pilot. The Red River is navigable from Fargo to the end, but boats ordinarily run only from Grand Forks. The railroad systems are three, besides small local lines: the Great Northern and the Northern Pacific cross the entire State from east to west as part of their through lines, the former mostly north of the parallel of 48°, the latter a little south of 47°, and the Minneapolis, St. Paul & Sault Ste. Marie cuts it diagonally through the centre, connecting at the Canadian boundary with a branch of the Canadian Pacific. The Chicago & St. Paul and the Chicago & Northwestern also enter the State with short branches in the south; and the Bismarck, Washburn & Grand Forks has a section from Bismarck to Washburn open 45 miles along the Missouri. There were 3,300 miles of main track in the State at the end of 1902, an increase of 219 miles in two years, and business sections are well served.

Education.— The schools are managed by a board of commissioners composed of the governor, the superintendent of public instruction, and the president of the State University. The public schools of the State have a land endowment valued at $50,000,000. One eighteenth of all lands were reserved for them at the outset by the constitution; making 2,531,200 acres, besides other gifts. None of these lands may be sold at less than $10 per acre, and the State is obligated to make good any shortages. In 1902 there were 3,262 schools and 4,319 teachers, with 103,728 enrolled pupils; the expenditures on them by the State were $1,670,093.28. The estimated value of the public school buildings and furnishings was $2,889,000. There were, of institutions for higher and special education, an Agricultural College at Fargo, largely supported by Congress; a State University at Grand Forks, with a School of Mines connected therewith; a State Normal School at Valley City, and another at Mayville; a School of Forestry at Bottineau, and a Scientific School at Wahpeton, all provided for by the constitution and possessing large land grants. There are nearly 100 traveling libraries in use in the system. There are about 225 periodicals and newspapers published in the State.

Churches.— In 1902 the chief bodies were the Swedish and Norwegian Lutherans, with 237 societies; the Methodists, with 215; Roman Catholics, 121; Presbyterians, 115; Congregationalists, 104; Baptists, 67; Episcopalians, 35.

Charitable and Penal Institutions.— There is a State Insane Hospital at Jamestown; an Asylum for the Blind at Bathgate; an Institution for the Feeble-Minded at Grafton, with a new building lately opened; a Deaf and Dumb Asylum at Devil's Lake; a Soldiers' Home at Lisbon; an Industrial School and School for Manual Training at Ellendale; a State Penitentiary at Bismarck; and a State Reform School at Mandan.

State Government and Finances.— The governor is elected for two years, and receives $3,000 a year. He has a veto by items. The State officers are elected in November of the even-numbered years. The legislature is composed of a Senate to consist of 30 to 50, and a House of Representatives to consist of 50 to 140; it now has 103. It meets biennially in January of the odd-numbered years, and the sessions are limited to 60 days. The supreme court has three justices, a chief and two associates; when the State has 600,000 people it may increase the number to five. Women may vote for school offices, and may hold them. Under the new apportionment of the census, the State sends two Representatives to Congress. It has been heavily Republican since its admission, except in 1892, when the Democratic-Populist fusion barely carried it; it is so at present by nearly two to one. The Democratic platform (1896) especially favored adequate taxation of corporations, and denounced "government by injunction." The State constitution makes it a misdemeanor for any one to interfere with another's obtaining, or enjoying after having obtained, employment from any one. It also provides for the prohibition of the liquor traffic. The assessed valuation of the State for 1903 was $133,880,414. The State, by its constitution, is limited to a 4-mill tax, but the interest on the bonded debt, school tax, etc., raises it to 7.2. The balance in the treasury on 1 Jan. 1903 was $670,409.35; the bonded debt was $682,300. The income during 1902 was $2,125,232.24. A permanent sinking fund was established during the year; the interest-bearing warrants for current expenses, which had been much overdue and shunned by investors, were taken up, and the finances of the State put on a sound footing.

Population and Civil Divisions.— In 1880 the population of this section of what was then Dakota Territory was 36,305, excluding Indians; in 1890, it was 174,545, or 182,719 altogether; in 1900, 319,146 altogether; the government estimate for June 1903 is about 360,000, but the rapid development of coal mining and recent heavy emigration to the State may have raised it beyond that figure. Of this total, 311,712 were white, 286 colored, 6,968 Indians, and 180 Chinese and Japanese. The foreign-born were 113,091; but as of these 25,004 were Canadian English, 2,909 English from England, 1,800 came from Scotland, and 2,670 from Ireland, of whom probably a third, or 800 to 900, were English and Scotch from the North; there were not over 70,708 of really alien blood. Of this mass, more than half were Scandinavians,— 30,206 Norwegians, 8,419 Swedes, and 3,953 Danes; 14,979 Russians; 12,677 Germans from Germany and Austria; 3,162 French Canadians; 2,670 from Ireland altogether; 1,445 Bohemians;

700 Italians, and 353 Rumanians (Jews, as were nearly all the nominal Russians and some of the Germans).

The two chief places of the State are Fargo and Grand Forks, both on the Red River of the North, at the crossing respectively of the Northern Pacific and the Great Northern railroads. Fargo had 9,589 in 1900, having nearly doubled since 1890; Grand Forks had 7,652 in 1890, and 10,000 in 1900. The other towns of importance are Bismarck, the capital, 3,319, on the Missouri; Jamestown on the Dakota (James) River, and the N. P., 2,853; Valley City on the Sheyenne at the crossing of the N. P. and the M., St. P. & S. Ste. M., 2,446; Grafton on the Park west of the Red River in the north, 2,378; Wahpeton on the Red River in the south, 2,228; Dickinson on the Heart River in the southwest, on the Northern Pacific, 2,076, and Minot in the northwest. The Indians are nearly all on four reservations: Standing Rock, on the Missouri in the southern centre; Fort Berthold, around the junction of the Little with the main Missouri; Devil's Lake, and Turtle Mountain. There are also several military posts; the largest is to be Fort Lincoln near Bismarck, and contain 62 buildings.

The State has 39 counties, as follows, with their capitals:

Barnes, Valley City.	Morton, Mandan.
Benson, Minnewaukon.	Nelson, Lakota.
Billings, Medora.	Oliver, Sanger.
Bottineau, Bottineau.	Pembina, Pembina.
Burleigh, Bismarck.	Pierce, Rugby.
Cass, Fargo.	Ramsey, Devil's Lake.
Cavalier, Langdon.	Ransom, Lisbon.
Dickey, Ellendale.	Richland, Wahpeton.
Eddy, New Rockford.	Rolette, Rolla.
Emmons, Williamsport.	Sargent, Forman.
Foster, Carrington.	Stark, Dickinson.
Grand Forks, Grand Forks.	Steele, Sherbrooke.
Griggs, Cooperstown.	Stutsman, Jamestown.
Kidder, Steele.	Towner, Cando.
Lamoure, Lamoure.	Traill, Hillsboro.
Logan, Napoleon.	Walsh, Grafton.
McHenry, Towner.	Ward, Minot.
McIntosh, Ashley.	Wells, Fessenden.
McLean, Washburn.	Williams, Williston.
Mercer, Stanton.	

History.— The old Territory of Dakota took its name, as did its river, from the Dakotas ("allies"), another name for the Sioux confederation. It formed a part of the Louisiana Purchase (q.v.) and when Lewis and Clark (see LEWIS AND CLARK'S EXPEDITION), were sent to explore the region in 1804, they wintered in the Mandan camps and were at the mouth of the Yellowstone in the spring. Lord Selkirk built a fort at Pembina in 1810, supposing it a part of his purchase from the Hudson's Bay Company. The first steamer ascended the Missouri in 1830. Frémont in his explorations penetrated to Devil's Lake in 1839. In 1841 George Catlin was here, and painted some of his famous Indian portraits. The first purchases of land from the Sioux were made in 1851. In 1857 the first settlement in Dakota was made at Sioux Falls, in South Dakota. When Minnesota was organized as a Territory in 1849, a portion of this district was assigned it. The Territory of Dakota was organized in 1861, and included Montana and parts of Wyoming and Idaho. The limits of the present North and South Dakota were fixed in 1868. Settlement was long checked by Indian wars, and the shelter taken here by the Sioux tribes expelled from Minnesota after the bloody outrages committed during the Civil War. In 1876 it was proposed to set off the northern part as the Territory of Pembina, but political antagonisms had arisen, and the population of the Territory had increased to half a million before final action was taken dividing it into two States. The great Scandinavian immigration began about 1885. The State was admitted into the Union 2 Nov. 1889.

ANDREW A. BRUCE,
Associate Dean University of North Dakota.

North Dakota Agricultural College, opened in 1891, at Fargo. The regular four years' courses include agriculture, general science, and mechanical engineering; the shorter courses are agriculture and steam engineering, two years, and a "farm school" of three months; there are also courses in domestic science and military science. The college is open to women, and there are women on the faculty. The campus includes 640 acres; a new sewerage system connecting all buildings and grounds with the main sewer of Fargo was completed in 1901. The income, which in 1901 amounted to $70,600, is derived mainly from State and Federal appropriations. The college organizes farmers' institutes in all parts of the State, under the supervision of the faculty; in 1901 18 such institutes were held, with an attendance of over 7,000. The faculty in 1901 numbered 26, and the students 604, of whom 259 were women.

North Dakota, University of, the State University opened in 1884 at Grand Forks. Its organization comprises a collegiate department, conferring the degree of A.B., a graduate department, a normal department, school of mines, department of military science, and a preparatory department; a business course is also provided. The State work in university extension is connected with the university and lectures are given throughout the State. Women are admitted on equal terms. When North Dakota was admitted to the Union, a grant of land was made to the university by Congress, and a separate grant to the school of mines. The campus contains 80 acres, and ground and buildings in 1902 were valued at $350,000; the income in 1903 amounted to $64,500. Tuition is free to residents of North Dakota. In 1903 the library contained 10,000 volumes, the students in attendance numbered 500 and the faculty 57.

North Downs. See DOWNS.

North Foreland, fōr'länd. See FORELAND, NORTH AND SOUTH.

North German Confederation, the union of German states in 1866 under the leadership of Prussia, which followed on the defeat of Austria, and the dissolution of the Germanic Confederation and led to the consolidation of the German empire during the Franco-German war (q.v.), when on 18 Jan. 1871 the King of Prussia was invested with the title of German Emperor at Versailles. See GERMANY.

North Holland, Netherlands, a maritime province, bordering on the North Sea, and bounded south by the provinces of South Holland and Utrecht. Area 1,069 square miles; pop. (1899) 968,105. See NETHERLANDS.

North Island. See NEW ZEALAND.

North Platte, plăt, Neb., city, county-seat of Lincoln County; at the confluence of the North and South Platte rivers, and on the

Union Pacific railroad; about 220 miles in direct line west of Lincoln, the capital of the State. It is in a productive agricultural region where irrigation has been introduced, and in which there is a large acreage of alfalfa, sugar beets, corn, and wheat. Considerable attention is given to stock-raising. The railroad machine shops here employ several hundred men. It has grain elevators, a cold storage plant, stock yards, brick, coal, and lumber yards. It is the seat of a United States land office. The Y. M. C. A. library has about 2,200 volumes. Pop. (1890) 3,055; (1900) 3,640.

North Pole. See ARCTIC REGIONS; POLAR RESEARCH.

North River, the name given to the lower course of the Hudson River. This name was applied in the early days when the Delaware was called the South River. See HUDSON RIVER.

North Sea, or **German Ocean,** a north-eastern extension of the Atlantic Ocean lying between Great Britain and the continent of Europe; lat. 51° to 61° N.; lon. 2° 30′ W. to 7° 30′ E.; Great Britain with the Orkney and Shetland islands being on the west; Denmark and part of Norway on the east; Strait of Dover, part of France, Belgium, Holland, and Germany on the south; and the Arctic Ocean on the north. Extreme length, from the Strait of Dover to Unst, the most northern of the Shetland Isles, about 700 miles; greatest breadth, between Haddingtonshire, Scotland, and Denmark, about 420 miles; area, over 140,000 square miles. The shores of all the countries that surround the North Sea are deeply indented with bays, fiords, inlets, and large estuaries; but its most remarkable arm is the Skager Rack, between Denmark and Norway, which communicates through the Kattegat with the Baltic Sea. The North Sea is deepest on the Norwegian side, where the soundings give 190 fathoms; but the mean depth of the whole basin may be stated at no more than 31 fathoms. The bed of this sea is traversed by several enormous banks, one of which trends from the Firth of Forth, Scotland, in a northeasterly direction, to a distance of 110 miles; others run from Denmark and Jutland upward of 105 miles to the northwest; while the greatest of all, the Dogger Bank, occupies the centre of the sea, from lat. 54° 10′ to 57° 24′ N. and lon. 1° to 6° 7′ E. The great oceanic tidal wave which originates in the Atlantic, after having swept the west coasts of Great Britain and Ireland, enters the northern extremity of the North Sea, giving high water nearly simultaneously to the opposite shores of Scotland and Norway. Pursuing its course along the coasts of the former and of England, it rules the tides as far south as the Thames, making the tour of Great Britain in 18 hours. On entering the North Sea, on the north of Scotland, the tidal wave does not exceed 12 feet; but gradually increases to 14, 16, 18, and in the Humber to 20 feet; a difference of height depending on the figure of the shore, the form of the bottom, and the direction of incidence of the wave. The fisheries in this sea are extensive, especially on the Dogger Bank, celebrated for its cod fishery, on all the shores that bound it; and in the direction of the Orkney and Shetland Isles. The North Sea has been from the earliest times one of the most important highways of the world. Lights both stationary and floating are placed along the difficult parts of the coast for the convenience of traffic, which of late years has increased enormously.

North Sea and Baltic, or **Kaiser Wilhelm, Canal.** See CANALS.

North Sea Canal, or **Amsterdam Canal.** See CANALS.

North Shields. See SHIELDS, NORTH and SOUTH.

North Star, in astronomy, the north polar star, of the constellation Ursa Minor, also called Polaris. It is close to the true pole, never sets, and is therefore of great importance to navigators in the Northern hemisphere. The line joining the stars of Ursa Major, or the Great Bear, nearly passes through it. See URSA MAJOR.

North Star, Order of. See ORDERS AND DECORATIONS.

North Tonawanda, tŏn-a-wŏn'da, N. Y., city in Niagara County; at the confluence of Niagara River and Tonawanda Creek, on the Erie Canal, and on the New York C. & H. R., the Erie, and the Lehigh V. R.R.'s; opposite Tonawanda, and 10 miles above Buffalo. Several other railroads, using leased tracks, and electric lines connect the city with Buffalo, Niagara Falls, and other places. North Tonawanda is in an agricultural region, but the city is noted for its manufacturing and commercial interests. It has large lumber yards, and the chief manufactures are steam pumps, merry-go-rounds, pig iron, bolts, nuts, steam piping, and a variety of lumber products. The public library has about 6,000 volumes. The charter of 1897 provides that the government shall be vested in a mayor, who holds office two years, and a council consisting of two members from each ward, and three at large. The city owns and operates the waterworks. Pop. (1890) 4,793; (1900) 9,069.

Northampton, nôrth-ămp'tŏn, England, a city, capital of the county of same name, 66 miles northwest of London, on the left bank of the Nen, and on the London and Northwestern, and Midland R.R.'s. Northampton was formerly walled and defended by a castle built soon after the Conquest, the ruins of which remain. The principal buildings are the town hall, the shire or county hall, the county and borough jails, corn exchange, barracks, infirmary, theatre, etc. There are a free library, museum, schools of science and art, grammar school, mechanics' institute, an athenæum, and other literary and artistic societies. The benevolent institutions include the infirmary, a lunatic asylum, the Royal Victoria Dispensary, St. John's and Thomas-à-Becket hospitals, etc. The principal churches are All Saints', rebuilt in 1680, after the designs of Sir Christopher Wren; St. Peter's, built about the same time as the castle, restored in 1850; St. Giles', dating from the 12th century; St. Sepulchre's, also of the 12th century, a round church on the model of the Church of the Holy Sepulchre at Jerusalem; and the Roman Catholic cathedral. The staple manufacture is boots and shoes for home and export trade, which employs about 12,000 hands. The curing of leather is also carried on on a large scale. The races, held on a race course north of the

town, attract great numbers of visitors. Besides two weekly markets there are 11 annual fairs. Pop. (1901) 87,021.

Northampton, Mass., city, county-seat of Hampshire County; on the Connecticut River, and on the New York, N. H. & H. and the Boston & M. R.R.'s; 18 miles north of Springfield, 109 miles west of Boston, and about 140 miles from New York city. The largest part of the city is known as the "Center," and the remainder includes the villages of Bay State, Florence, and Leeds. Nearby are Mount Holyoke and Mount Tom, both with electric railroads to the summit. The city is on a height which commands a fine view of the river valley. It was settled 14 May 1654 by English colonists, and was named after Northampton in England. Jonathan Edwards (q.v.) lived here for some years. It was incorporated on 18 October of the same year, and chartered as a city 1 Jan. 1884. It is in a productive agricultural section, but it has extensive manufacturing and commercial interests. The chief manufacturing establishments are sewing-silk mills, basket and paper box factories, lumber mills, brush factory, hardware works, hosiery mills, sewing machine and furniture factories, machine shops, pulp mills, emery wheel works, and foundries. There are about 3,000 employees in the manufactories. The trade is principally in the manufactured articles and farm products. It has a number of fine buildings and prominent institutions, among which are the Dickinson Hospital, the State Asylum for the Insane (1903, 700 patients), and the opera house. The last mentioned, a gift from a native of the city, is owned and managed by the municipality. There are a number of fine church buildings. The educational institutions are Smith College (q.v.); the Burnham Classical School for Girls; the Clarke Institute for Deaf Mutes, endowed by John Clarke; public and parish schools; three public libraries, gifts of natives of Northampton, and the "Home Culture Club," founded by George W. Cable (q.v.), and assisted by a gift of $50,000 from Andrew Carnegie. The educational advantages of this club have been of great benefit to a large number of men and women; unique features are the instructions in household arts and amusements. The three national banks have a combined capital of $650,000, and the three savings banks have a total deposit of $4,975,000. The "Smith Charities" has peculiar features that make it a most remarkable and beneficent institution. It was founded by the will of a public benefactor, who desired to aid a special class of worthy persons. On certain conditions young men and women and widows receive annual gifts of money, young women receive gifts when they marry, and young men, who learn a trade, receive a certain sum of money when they attain the age of 21. The charter of 1883 provides for a board of aldermen and a council of 21 members elected annually by the people. The board of education and the trustees of the Forbes Library are chosen by popular vote. The city owns and operates the waterworks. Pop. (1890) 14,990; (1900) 18,643. Consult Trumbull, 'History of Northampton.'

JAMES H. HUNTINGTON,
Editorial Staff, 'Daily Hampshire Gazette.'

North'bridge, Mass., town in Worcester County; on the Mumford and the Blackstone rivers, and on the New York, N. H. & H. railroad; about 10 miles southeast of Worcester. It was settled in 1662 and remained a part of Mendon until 1772 when it was incorporated as a separate town. Its chief manufacturing establishments are large cotton and woolen mills, machine shops, furniture and cigar factories. The government is administered by annual town meetings. Pop. (1890) 4,603; (1900) 7,036.

North'brook, Baron. See BARING, THOMAS GEORGE.

Northcote, nôrth'kōt, **James,** English artist: b. Plymouth, England, 22 Oct. 1746; d. London 13 July 1831. He early showed a taste for drawing and was encouraged to go to London, where he arrived (1771) with a letter of introduction to Sir Joshua Reynolds, under whom he worked for five years. He visited Italy in 1777 where he spent his time in copying the old masters, especially Titian. He returned to London in 1780, and six years later exhibited his first historical work, 'The Young Princes Murdered in the Tower.' Between 1783 and 1831 he exhibited no less than 229 historical paintings, taking subjects from English history or Shakespeare; these are chiefly remarkable for highly effective composition. The faces are Greek, the costumes absurd, the chiaroscuro fantastic and exaggerated, and the coloring inharmonious. His greatest skill is shown as an animal painter. His portraits are uneven, but those of men are better than those of women, while some of his children's and angels' faces are beautiful. This will be seen from his 'Portrait of Sir Simon Taylor'; 'A Dog and a Hawk'; 'Prince Arthur and Hubert'; 'Four Infant Angels in the Clouds.'

Northcote, SIR **Stafford Henry,** 1ST EARL OF IDDESLEIGH, English statesman: b. London 27 Oct. 1818; d. there 12 Jan. 1887. He was educated at Eton and at Balliol College, Oxford, became private secretary to Gladstone in 1843; was called to the bar in 1847, and in 1851 succeeded his grandfather in the baronetcy. He sat in Parliament in 1855 for Dudley, in 1858 was elected member for Stamford, and in 1866 for North Devon, which he represented till 1885. In 1862 he published 'Twenty Years of Financial Policy.' In 1866 he became president of the Board of Trade; in 1867–8 was secretary for India; in 1871 a member of the high joint commission, which arranged the Treaty of Washington; and in 1874–80 was chancellor of the exchequer in the cabinet of Disraeli. After the Liberals returned to power in 1880 he became Conservative leader in the Commons, and in 1885 he was raised to the peerage, and appointed first lord of the treasury. Consult his published 'Letters and Essays' (1887); Lang, 'Life, Letters, and Diaries of Stafford Northcote' (1890).

Northeast Boundary Dispute, the disagreement between the United States and Great Britain from 1783 to 1842 respecting the northeast frontier. The Treaty of 1783 defined the northeast boundary of the United States, toward Canada, as extending from the source of the St. Croix due north to the highlands or watershed between the Atlantic and St. Lawrence systems, thence along those highlands to the northwesternmost head of the Connecticut River.

Disputes arising over this definition, in 1831 the King of the Netherlands, as arbitrator, made an award which neither party was willing to accept. Finally, by the Webster-Ashburton Treaty of 1842, the present line was agreed upon, not greatly differing from that suggested by the Dutch king, and giving about seven twelfths of the disputed territory to the United States and about five twelfths to Great Britain. See BOUNDARIES, AMERICAN.

Northeast Cape. See CHELYUSKIN CAPE.

Northeast Passage. See ARCTIC REGIONS; POLAR RESEARCH.

Northen, nôr'tĕn, **Adolph,** German painter: b. Münden, Prussia, 6 Nov. 1828; d. Düsseldorf 28 May 1876. He was a pupil in the Düsseldorf Academy from 1847 to 1851, when he devoted himself to the delineation of soldier life and battle scenes. In 1852 he began a series of pictures illustrating the wars of Napoleon I. These included 'The Battle of Belle Alliance' (1860); and 'The Retreat of the Grand Army.' To these he added scenes from the war with Denmark, and from the German-Austrian war 1866. His series portraying the last Franco-Prussian war includes 'The Storming of Weinberg'; 'The Transport of French Prisoners'; and 'The Charge of the 16th Uhlans on a Square.'

Nor'ther. See COLD WAVE.

Northern Bear, in international politics, a name often applied to Russia.

Northern Drift, in geology, an obsolete name for the boulder-clay of the Pleistocene Period. The deposits were popularly supposed to have been brought by the polar currents from the far North.

Northern Giant, a name frequently applied in Europe to Russia, alluding to its size, growth, and population.

Northern Illinois College, a coeducational institution, in Fulton, Ill.; founded in 1861, opened in 1865; reported in 1903: professors and instructors, 12; students, 220; volumes in the library, 1,000; value of grounds, buildings, and scientific apparatus, $110,000; total income, $8,000. The departments are preparatory, collegiate, and the summer school. The courses lead to the degrees of A.B., B.S., Ph.B., and B.L. There is no endowment fund.

Northern Lights. See AURORA BOREALIS.

Northern Mythology. See MYTHOLOGY.

Northern Territory. See SOUTH AUSTRALIA.

North'field, Mass., town in Franklin County; on the Central Vermont railroad; about 12 miles northeast of Greenfield and 30 miles northwest of Fitchburg. It is famous as a centre of religious training. It is the birthplace of Dwight L. Moody (q.v.) and was his home and the scene of much of his work. The annual conferences of Christian workers and of students are held, in summer, in Northfield. The town is the seat of the Northfield Training School and of the Northfield Seminary for young women. The Mount Hermon School for Boys, in the adjacent town of Gill, is connected with the Northfield educational work. The town is in an agricultural region and its industries are connected with farm products. The government is administered by town meetings. Pop. (1890) 1,869; (1900) 1,966.

Northfield, Minn., city in Rice County; on the Cannon River, and on the Chicago G. W. and the Chicago, M. & St. P. R.R.'s; about 40 miles south by west of Saint Paul. It was settled in 1856 and in 1875 was chartered as a city. It is in a fertile agricultural section in which wheat is one of the principal crops. The chief manufactures are knit goods, dairy products, flour, and brick. It has considerable trade in grains and live stock. It is the seat of Saint Olaf College, opened in 1875 under the auspices of the Lutheran Church, and of Carleton College, opened in 1870 by Congregationalists. Other educational institutions are the Scoville Library, the Goodsell Observatory, and the public schools. It has the Odd Fellows' Orphans' and Widows' Asylum, a Y. M. C. A. building, and several fine churches. The city owns and operates the waterworks. Pop. (1890) 2,659; (1900) 3,210.

Northfield, Vt., village in Washington County; on the Dog River, and on the Central Vermont railroad; about nine miles south by west of Montpelier. It is in a valley surrounded by low hills and mountains, Bald and Paine mountains are near. In the vicinity are black slate and granite quarries. The chief industries are connected with the quarrying of granite and slate, and with farm and dairy products. It has flour and lumber mills and woolen factories. It is the seat of the Norwich University, opened in 1834. The village owns and operates the electric light plant. Pop. (1890) 1,222; (1900) 1,508.

Northington, nôr'thĭng-tŏn, **Robert Henley,** 1ST EARL OF, English statesman: b. about 1708; d. Grange, England, 14 Jan. 1772. He was educated at Oxford; in 1733 was called to the bar, and in 1747–57 sat in Parliament for Bath. In 1756 he was appointed attorney-general, and in the next year became lord keeper of the great seal and took his seat as speaker of the House of Lords over which he presided for three years. In 1761 he was made lord chancellor, and owing to ill-health resigned in 1767.

North'men. See NORMANS.

Northrop, nôr'thrŭp, **Birdsey Grant,** American educator and clergyman: b. Kent, Conn., 18 July 1817; d. Clinton, Conn., 27 April 1898. He was graduated at Yale in 1841; and from its divinity school in 1845; and was subsequently a pastor of a Congregational Church at Saxonsville, Mass., for 10 years. He was agent of the Massachusetts State Board of Education 1857–67 and secretary of the Board of Education of Connecticut 1857–67. He introduced the observance of Arbor Day in schools, and was considered as the "father of Village Improvement Societies." In 1872 he was invited by the Japanese government to establish a system of public education in Japan. Although he declined the honor he rendered such valuable service to that country that he was received as the guest of the Japanese nation.

Northrop, Cyrus, American educator: b. Ridgefield, Conn., 30 Sept. 1834. He was graduated from Yale in 1857, from its law school in 1859, and was admitted to the bar in 1860. He was clerk of the Connecticut House of Rep-

resentatives in 1862 and of its Senate in 1863. He became editor of the New Haven 'Palladium' in 1863 and in 1863–84 was professor of rhetoric and English literature at Yale. From 1869–81 he was collector of the port of New Haven, and in 1884 he accepted the presidency of the University of Minnesota which he has since held.

Northrop, Harry Pinckney, American Roman Catholic bishop: b. Charleston, S. C., 5 May 1842. He was graduated from Mount Saint Mary's College, Emmitsburg, Md., in 1860, studied four years in the theological seminary there and at the American College in Rome, and was ordained to the priesthood in 1865. He held several pastorates in his native city and elsewhere, and was consecrated bishop in 1882 as vicar apostolic of North Carolina, and titular bishop of Rosalia. In 1883 he was transferred by papal brief to the see of Charleston.

Northumberland, nôr-thŭm'bėr-land, **John Dudley, Duke of,** English statesman: b. England 1502; d. London 22 Aug. 1553. During the war with France 1544–5 he commanded the English squadron, and later was one of the executors of the will of Henry VIII. He schemed against Somerset, the Protector, and in 1550 was the dominant influence in the council. The next year he was created Duke of Northumberland, lord high steward, and earl marshal. His fourth son, Lord Guilford Dudley, married Lady Jane Grey in May 1553, and the duke persuaded Edward VI. to name her as his successor. Through Northumberland's influence she was placed on the throne 10 July, but on the 22d of August following he was executed for high treason.

Northumberland, Robert de Mowbray, Earl of, English warrior: d. about 1125. He was a son of Roger de Montbrai, a follower of William the Conqueror, and was made Earl of Northumberland some time not far from 1080. He was constantly engaged in feudal quarrels in the course of which he burned Bath and ravaged Wiltshire, and when Malcom, king of Scots, invaded the country for a second time in 1093 he was met and slain by Mowbray at Alnwick. He raised an insurrection in 1095 and endeavored to wrest from the Conqueror's sons the crown and give it to their cousin, Count Stephen of Aumâle. At first successful he was finally forced to retreat to his great castle of Bamborough where, after a stout resistance, he was finally taken, and though reports conflict, it is reasonably certain that the remaining 30 or more years of his life were spent in prison. He founded the priory at Tynemouth.

Northumberland, Earls of. See Percy.

Northumberland, England, a maritime county bordering on Scotland and on the North Sea; area 2,015 square miles. The county-seat is Newcastle-upon-Tyne, and other large towns are Wallsend and Tynemouth. The surface is diversified with hill, moorland, and valley, and its principal river is the Tyne. Coal mining and its supplemental industries place Northumberland high among the most productive counties of England. Pop. (1901) 602,859.

Northum'bria, England, an ancient Anglo-Saxon kingdom, one of the Heptarchy, which extended from the Humber to the Forth, and was bounded on the west by the kingdoms of Strathclyde and Cumbria. The kingdom was founded by Ida, an Anglian chief, who invaded the country in 547. On the death of Ida in 560 part of it was incorporated in the kingdom of Deira, which occupied also what is now Yorkshire. Bernicia and Deira were united under Ethelfrith in 593. In 792 it was ravaged by the Danes, and again in 844 and 867, when they permanently settled in the country. Halfdane became sovereign, and portioned out the land among his followers. In the treaty which Alfred made with the invaders Northumbria was included in the Danelagh. Against Alfred's successors the Danes carried on a series of petty wars, till the dissolution of the kingdom of Northumbria in 950. It was then divided into the three earldoms or counties of Bernicia, Deira, and Lothian.

North'west Boundary Dispute, the disagreement between the United States and Great Britain from 1814 to 1846, respecting the northwest frontier. The territory bounded north by latitude 54° 40′, east by the Rocky Mountains, south by latitude 42°, and west by the Pacific Ocean had been claimed at various times and to various extents by Russia, Spain, Great Britain, and the United States. The Russian claim, which rested mainly upon occupation by fur traders, was settled by a treaty 11 Jan. 1825. Under this treaty the United States were to make no settlements north of latitude 54° 40′, and Russia none south of that latitude. Great Britain and Russia agreed upon the same terms. The Spanish claims were confined south of latitude 42° by the treaty which ceded Florida in 1819. Great Britain had little or no claim by discovery. The United States' claim rested upon the voyage of Gray up the Columbia River in 1792 and the explorations of Lewis and Clark through the Rocky Mountains and through the Oregon country in 1805–6, under the orders of Jefferson. By the treaty of 20 Oct. 1818 the whole territory west of the Rocky Mountains was to be opened to both countries for 10 years, and, in 1827 the joint occupation for an indefinite period was agreed upon. Later this produced dissatisfaction, and after considerable negotiation, Great Britain was induced in 1846 to accept latitude 49° as the boundary from the Rocky Mountains to the channel between Vancouver's Island and the mainland. See Boundaries, American; Alaskan Boundary Commission.

Northwest Company, The, an organization of French-Canadian traders who, in the 18th century, entered the fur trade as a rival of the Hudson's Bay Company, which had enjoyed a monopoly for 200 years. In 1805 the Northwest Company established trading posts on the Pacific coast and in 1813 absorbed the Pacific Fur Company, established by John Jacob Astor. In 1821 the Northwest Company consolidated with the Hudson's Bay Company. See Fur Trade, The.

Northwest Frontier Province, British India, a new political division formed in November 1901, out of the northwestern portion of the Panjab province, and comprising mainly the Peshawar district, and portions of other districts lying beyond the Indus. Besides Peshawar, the capital, the province contains the towns of Kohat, Dera Ismail Khan, Edwardes-

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CYRUS NORTHROP.

PRESIDENT UNIVERSITY OF MINNESOTA.

Mr. U

abad, Kalabagh, Abbottabad, Yank, and Kulachi. Area 13,197 square miles; pop. (1901) 2,044,000.

Northwest Passage. See ARCTIC REGIONS; POLAR RESEARCH.

Northwest Provinces, India, until 1901, the designation of a political division now THE UNITED PROVINCES OF AGRA AND OUDH (q.v.).

Northwest Territories, Canada, the political division comprising the organized territories of Assiniboia, Alberta, and Saskatchewan, and the unorganized regions of Athabasca, Mackenzie, Ungava, and Franklin (qq.v.). The designation also in a general sense includes Keewatin, a district of Manitoba since 1876, and the Yukon Territory established in 1901. The political division has an area of 2,371,481 square miles. This immense district (excluding Labrador) was known as the Hudson Bay Territory up till 1870, when the Hudson's Bay Company surrendered it to Canada for the sum of £300,000. The territories are governed by a lieutenant-governor and executive council, and a legislative assembly. Regina is the seat of government. The climate generally is of an Arctic character with long and rigorous winters, and short summers; the agricultural capabilities of a part of this region to the south, however, are very great. The fertile belt of the Saskatchewan alone contains an area of 64,000 square miles in one continuous strip of 800 miles long, with an average breadth of 80 miles. But the best and largest wheat area is beyond the Saskatchewan, in the valleys of the Athabasca and Peace rivers, and extending through the Peace River Pass to the western slope of the Rocky Mountains, and north to lat. 60° N. The lakes and rivers west of Lake Superior are bordered by rich prairies and luxuriant woods. Coal is abundant and is now worked; petroleum is plentiful; copper, silver, iron, salt, and gold have been found, the last especially on the Klondike River in the Yukon district. Great quantities of furs are obtained. The Canadian Pacific Railway crosses the southern part of this territory, and there are several other railways made or to be made. In the towns and villages springing up along the lines of railway free schools are established, and in the Rocky Mountain region five tracts of land have been reserved as national parks. Pop. (1901) 220,000, of whom 27,057 were Indians.

Northwest Territory, the name given by the Continental Congress of America, in 1787, to a region east of the Mississippi, north of the Ohio, south and west of the Great Lakes, and west of Pennsylvania. The greater part of this territory belonged to France prior to 1763, when, by treaty, Great Britain became possessor of all the domain east of the Mississippi, in North America, which had been claimed by France. The territory west of the Alleghany Mountains and north of the Ohio River was, in 1774, annexed to the Province of Quebec. By the treaty of peace with Great Britain, at the close of the Revolutionary War, in 1783, this region was ceded to the United States. Its area was about 265,878 square miles, and it bordered on all the great interior waterways of North America which had then been explored; the Saint Lawrence River because a part of the Great Lakes not excluded. The exact status of this territory was a subject of dispute for several years, on account of the conflicting claims of ownership of New York, Virginia, Connecticut, and Massachusetts. The States mentioned cited in support of their claims various early grants from the Crown, and conquests of Indian tribes. The original Colonial charter usually gave definite north, east, and south boundaries, but that of the west was often the sea, the South Sea, the ocean, etc., which was interpreted as Pacific Ocean. The other States of the Union refused to recognize the claims based on charters and acts as cited, but held that the lands in question should belong to the whole Union and should be administered for the common good. Congress in session, in 1780, gave a pledge to the Union that if the States claiming this western territory should cede it to the Confederation it should be used for the good of all the States, and should, in due time and under proper conditions, be admitted as States of the Union, with equal rights and privileges with the original States. New York was the first to cede her claims, in 1781; three years later Virginia ceded her claims, except a section north of the Ohio River (now the southern part of the State of Ohio) called for sometime the "Virginia Military District." In 1785 Massachusetts gave up her claims, and in 1786 Connecticut ceded all except a strip extending from the Pennsylvania boundary westward 120 miles, comprising about 6,000 square miles and called the "Western Reserve" (q.v.). Connecticut retained jurisdiction over this territory until 1800. A tract of 500,000 acres, in the western part of the "Western Reserve," was donated by Connecticut as "Fire Lands" to be divided as directed among such of its citizens as had been damaged by incursions of the British troops during the Revolutionary War. On 13 July 1787 the "Northwest Territory" was established by the Continental Congress. The ordinance was prepared by the chairman of the committee, Nathan Dane of Massachusetts. This ordinance provided for the enactment of certain rules deemed necessary for the public good, the chief provisions of which were (1) that not less than three nor more than five States should be formed out of the "Northwest Territory"; (2) that slavery should be prohibited forever within its borders; (3) that religious freedom should be wholly and entirely established and maintained; (4) that schools and means of education should be forever encouraged; (5) that the writ of habeas corpus and trial by jury should be guaranteed to all its inhabitants. A form of government was provided for and the territory was divided. It was further provided that when any one of the divisions had a population of 60,000, it might be admitted into the Union as a State. Certain conditions of admission were exacted in accordance with the Ordinance of 1787. The Continental Congress which established the "Northwest Territory" and so wisely provided for its admission into the Union, had its last roll-call 10 Oct. 1788.

The new Congress confirmed the Ordinance relating to this territory. At first the government was administered by means of a governor, secretary, and three judges appointed by Congress, who governed the whole as one district. The governor and judges sitting together had power to make and execute such laws as they

deemed needful for the district, subject to the approval of Congress, until such time as the territory would have a legislature of its own. Provision was made for a legislature when there were in the territory 5,000 free male inhabitants of full age to be voters. This legislature was to consist of a Legislative Council of five members, chosen by Congress, and a House of Representatives chosen by male inhabitants who were freeholders. The first governor of the Northwest Territory, Arthur St. Clair, was appointed October 1787. He arrived at Marietta, the capital, July 1788. His first official act was the founding of Washington County. He appointed magistrates, established courts, arranged for defense against the Indians, and in every way sought to promote the advancement of the country. The first legislature of the Territory met 24 Sept. 1799. The House of Representatives had 22 members, representatives of the nine counties of the whole Territory. In May 1800, upon petition, Congress divided the Northwest Territory into two territorial governments; the boundary between which was a line extending from the mouth of the Kentucky River north to Canada. The portion east of this line was called "Territory Northwest of the River Ohio," and its capital was Chillicothe. The portion west of this line was called "Indiana Territory" and the capital was Vincennes. William Henry Harrison was first governor of the "Indiana Territory." Virginia completed her articles of cession 1 March 1784. On that same day Jefferson, as chairman of a committee, proposed a plan which was adopted by Congress 23 April 1784. The territory was to be divided into States, each State two degrees wide and the lines to be intersected by two meridians, one passing through the falls of the Ohio and the other through the mouth of Kanawha River. The States were to be named, Chersonesus, Assenisipia, Sylvania, Pelisipia, Illinoia, Polypotamis, Washington, Mesopotamia, and Michigania. The plan or report of the committee stated further, that after 1800 there should be in the new States neither slavery nor involuntary servitude except as a punishment for crime. The plan never went into effect, and was superseded by the Ordinance of 1787 whereby the Northwest Territory was established as mentioned. In 1785, the year Massachusetts yielded her claims, Congress provided for a survey of the lands in dispute. Ohio, the first State formed out of the Northwest Territory, was admitted in 1803, and was the 17th State of the Union. Michigan Territory was created January 1805, and William Hull was first governor. It was admitted as a State in 1837. Illinois Territory was organized in 1809; Kaskaskia was the capital. It was admitted as a State on 3 Dec. 1818. Indiana was admitted as a State in 1816. A part of Michigan Territory was in 1836 organized as the Territory of Wisconsin. It became a State in 1837. A part of the Territory of Wisconsin is now the eastern part of Minnesota.

Consult: Higginson, 'History of the United States,' pp. 309–344; Hart, 'Source Book,' ch. xi.; Thomas, 'History of the United States,' pp. 182–183; Hinsdale, 'The Old Northwest'; Moore, 'The Northwest Under Three Fags.'

Northwestern College, a coeducational institution in Naperville, Ill.; founded by the Evangelical Association in 1861. In 1903 there were connected with the school 25 professors and instructors and nearly 400 students. The library contained about 6,000 volumes; the grounds and buildings were valued at $120,000; the amount of productive funds was $114,000; the income, about $20,000; and the benefactions, $11,500. The number of graduates is about 500.

Northwestern University, Ill., chartered under the auspices of the Methodist Episcopal Church in 1851, and first opened in 1855. The first department organized was the collegiate department; the present organization includes (1) the College of Liberal Arts; (2) the Medical School; (3) the Law School; (4) the School of Pharmacy; (5) the Dental School; and (6) the School of Music; the College and School of Music are at Evanston, Ill., and the professional schools in the city of Chicago. The university also maintains two secondary schools, the academy at Evanston and the Grand Prairie Seminary at Onarga, Ill. The Garrett Biblical Institute, a theological school, though under separate management, is located on the college campus, and is in close affiliation with the university; the Norwegian-Danish Theological School and the Swedish Theological Seminary are also affiliated with the institute. The work of the College of Liberal Arts is mainly elective, the courses being arranged for major work in one department and minor work in another; the degrees of A.B., Ph. B., B.S., and B.L. are conferred, but after June 1904 the latter will be discontinued; the corresponding master's degrees and Ph.D. are conferred for graduate work. The government is by a board of 44 trustees chosen by church conferences. Women are admitted, and dormitories on the campus are provided for their use. The campus contains 45 acres on the shores of Lake Michigan; the buildings include the Old College, the first building erected, University Hall, the Fayerweather Hall of Science, the gymnasium, the observatory, and the library. There is a large athletic field, and the athletic affairs of the college are under the management of a committee of nine, three from the faculty, three from the alumni, and three from the Students' Athletic Association. The students' debating society is affiliated with the Central Debating League, including the students' societies of the universities of Michigan, Chicago, and Minnesota; and with the Northern Oratorical League, including societies from the universities of Michigan, Wisconsin, Iowa, Chicago, Minnesota, and Oberlin College. The university library contains over 50,000 volumes, besides 35,000 pamphlets, and the professional schools have also special libraries. In 1903 the productive funds amounted to $2,950,000; and the annual income was $418,269. The number of students in attendance was 3,200, and the number of professors and instructors 322.

Norton, nôr'tŏn, **Andrews**, American Unitarian theologian: b. Hingham, Mass., 31 Dec. 1786; d. Newport, R. I., 18 Sept. 1853. He was graduated at Harvard in 1804, and after studying theology was a tutor in Bowdoin College in 1809. He returned to Harvard in 1811 as mathematical tutor there; and became in 1813 librarian of the university and lecturer on Biblical criticism and interpretation. In 1819–30 he was Dexter professor of sacred literature. He

was among the most eminent exponents of Unitarianism, equally strong in his protests against Calvinism and the naturalistic theology represented by Theodore Parker. He published 'Reasons for not Believing the Doctrines of Trinitarians' (1833); 'The Genuineness of the Gospels' (1837–44); 'The Latest Form of Infidelity' (1839).

Norton, Caroline Elizabeth Sarah Sheridan, English poet and novelist: b. London 1808; d. there 15 March 1877. A granddaughter of Richard Brinsley Sheridan and a sister of Lady Dufferin, she showed her talent at 13 with 'The Dandies' Rout.' She was married to George Chapple Norton in 1827; procured for him a police magistracy by her influence with the Home Office; broke with her husband in 1836, when he accused Lord Melbourne (q.v.) of criminal intercourse with her; and was vindicated entirely of this charge in a famous suit, the basis of Dickens' Bardell *v.* Pickwick, in the 'Pickwick Papers.' Her differences with her husband were not then ended, for he claimed the custody of her children and the income from her writings. She wrote 'English Laws for Women in the Nineteenth Century,' a pamphlet which contributed to the change of English laws as to the status of women. Two weeks before her death Mrs. Norton married Sir William Stirling Maxwell. Her principal works are: 'The Sorrows of Rosalie' (1829), a Byronic poem; 'The Dream' (1840); 'The Lady of La Garaye' (1862), her best poem, which has much the tone of Campbell; 'A Voice from the Factories' (1836); and 'The Child of the Islands' (1845), both attacking social conditions; and the novels, partly autobiographical, 'Stuart of Dunleath' (1851), 'Lost and Saved' (1863), and 'Old Sir Douglas' (1867).

Norton, Charles Eliot, American scholar: b. Cambridge, Mass., 16 Nov. 1827. He was a son of Andrews Norton (q.v.) and after he was graduated from Harvard in 1840 was for a time in the employ of a Boston establishment in the India trade. Except a voyage to India in 1849 and various trips to Europe his life has been passed in the house where he was born. During the Civil War period he edited the papers of the Loyal Publication Society and with his friend, J. R. Lowell, edited the 'North American Review' 1864–8. From 1875 to 1900 he was professor of the history of art at Harvard, becoming professor emeritus in the year last named. As a Harvard professor he has exercised a salutary influence over successive generations of collegians before whom he has placed the highest ideals of both scholarship and citizenship. Hundreds of young men have been helped by him to quicker perception of what culture really is as well as to discriminative discernment between true and false culture — between thoughtful, intelligent citizenship, and the noisy, puppyish assertion that so often passes itself off as patriotism. Few Americans have been sterner critics than he of whatever in American life falls below an ideal standard, and as a consequence few men, not professedly politicians, have been the target for so much adverse comment as has Professor Norton. Stigmatized often as unpatriotic he has risen to a much higher level of patriotism than his critics. He has enjoyed the friendship of many of the foremost personages of his time and has been the literary executor of such men as Lowell, Carlyle, Emerson, Curtis, and Ruskin. He is the foremost of American Dante scholars and was the founder of the American Dante Society, as well as of the Archæological Institute of America, of which he was the president for many years. His published books include: 'Considerations on Some Recent Social Theories' (1863); 'The New Life of Dante' (1859, a partial translation with essays, followed by a complete translation); 'Notes of Travel and Study in Italy' (1860); 'Historical Study of Church Building in the Middle Ages' (1880); 'The Divine Comedy of Dante' (1891–2), a much prized prose translation. He has also edited 'The Early Letters of Thomas Carlyle' (1886); 'Letters of James Russell Lowell' (1894).

Norton, Charles Led'yard, American author: b. Farmington, Conn., 11 June 1837. He was graduated at Yale in 1859; served in the Federal army during the Civil War; was editor of the 'Christian Union' 1869–79, and in 1893 became editor of 'Outing.' He has published 'Canoeing in Kanuckia' (1878), with J. Habberton; 'Handbook of Florida' (1890); 'A Medal of Honor Man; or, Cruising among Blockade-Runners' (1896); 'A Soldier of the Legion'; 'The Queen's Rangers'; 'Political Americanisms' (1890); etc.

Norton, Charles Stewart, American rear-admiral: b. Albany, N. Y., 10 Aug. 1836. He was graduated at the United States Naval Academy in 1855; became commander in 1870, captain in 1881, commodore in 1894; and was promoted rear-admiral in 1897. During the Civil War he served with honor at Charleston, Hampton Roads, and Port Royal. After the War he served on the board of inspection and survey; commanded the South Atlantic station in 1894–6, and was in charge of the Washington navy yard and station 1896–8. He was retired in the year last named, having reached the age limit.

Norton, Frank Henry, American journalist: b. Hingham, Mass., 20 March 1836. He was connected with the Astor Library in New York (1855–65) as assistant librarian and assistant superintendent, and entering journalism in 1872 was editor and owner of the New York 'Era' 1879–81, and from 1883 to 1891 on the staff of the New York *Herald.* Besides such dramatic burlesques, etc., as 'Alhambra,' 'Cupid and Psyche,' he has written 'Life of Alexander H. Stephens' (1883); 'The Malachite Cross' (1894); etc.

Norton, John, American colonial clergyman: b. Shortford, Hertfordshire, England, 6 May 1606; d. Boston, Mass., 5 April 1663. He was educated at Cambridge University, entered the ministry and in 1635 left England and came to Boston. He was pastor at Ipswich in 1636–52; then he succeeded John Cotton as colleague of John Wilson in the pastorate of the First Church of Boston. In this charge his influence steadily increased and his opinions came to be sought by officials of both church and state. He was still in this position when the colonies decided to send their petition to George II. in 1662, and was selected to accompany General Bradstreet; though the petition was nominally granted and Norton had without doubt performed his delicate task with fidelity, the colonies were dissatisfied with the results and hencefor-

ward his popularity waned. This change in public feeling was without doubt the cause of his death in the following year. He wrote: 'Responsio ad Totam Questionum Syllogen'; 'The Orthodox Evangelist' (1654); 'The Heart of New England Rent by the Blasphemies of the Present Generation' (1660); etc.

Norton, Lillian. See NORDICA, LILLIAN.

Norton, Sidney Augustus, American chemist: b. Bloomfield, Trumbull County, Ohio, 11 Jan. 1835. He was graduated from Union College, Schenectady, N. Y., in 1856 and from Miami Medical College in Cincinnati 1867, in which latter institution he was professor of chemistry 1867–72. In 1873 he became professor of chemistry in Ohio State University. He has published: 'Elements of Natural Philosophy' (1870); 'Essays and Notes' (1874); 'Elements of Physics' (1875); 'Elements of Inorganic Chemistry' (1878); 'Organic Chemistry' (1884); etc.

Norton, Thomas, English dramatist: b. Bedfordshire, England, 1532; d. England 1584. He collaborated with Sackville in writing 'The Tragedie of Gorboduc' (1560–1) which was the first English blank-verse tragedy.

Norton, Thomas Herbert, American chemist: b. Rushford, N. Y., 30 June 1851. He was graduated from Hamilton College, Clinton, N. Y., in 1873 and afterward studied at Heidelberg. From 1878 to 1883 he was manager of important chemical works in Paris, France, and was professor of chemistry in the University of Cincinnati 1883–1900. In May 1900 he was appointed to establish the United States consulate at Harput, Turkey.

Norton Sound, an arm of Bering Sea indenting the west shore of Alaska. It is about 220 miles long and 200 miles wide from Cape Nome to Cape Dyer. The Yukon is the largest river flowing into the Sound, a number of short streams enter from the north. The coast is irregular, the largest indentations are Golofnin and Norton bays and Golofnin Sound. A number of islands are along the coast, the largest are in the eastern part of the Sound. Nome (q.v.) is the most important city on the coast. Captain Cook discovered Norton Sound in 1778.

Norumbega, nō-rŭm-bē'gą, a name given by the early explorers to various parts of the eastern coast of North America, also to a river, and to an Indian city. In 1539 the name was applied to the whole coast from Cape Breton to Florida, but this seems to have been on the authority of an anonymous narrative called 'Dieppe Captain.' The map of Verrazano's voyage, published in 1529, locates Aranbega on the coast of New England; Mercator's map, published in 1541, locates Anorumbega near the Hudson River; Gastaldi's map, 1556, locates Norumbega near Cape Breton. Other accounts mention Norumbega as a large river, brackish near the mouth; and still others picture it as a city with high towers and substantial houses. The rivers mentioned are supposed to have been Penobscot, Connecticut, or Hudson. Champlain, in 1605, applied the name to Maine and also to the Penobscot River. Humphrey Gilbert (q.v.) in 1583, began an exploration of the beautiful country of Norumbega, and so convinced was he of its existence, that he took with him a poet to sing its praises. A map of 1582 makes Penobscot River a strait connnecting the Saint Lawrence with the ocean at the mouth of the Penobscot. The country between was called Norombega. The origin of the word has been attributed to many languages; as an Indian word meaning "still water"; a Spanish word meaning "fields"; a Norse word, *Norvegr,* meaning Norway; etc. In 1889 Prof. Horsford caused the erection of a memorial tower at the confluence of the Charles River and Stony Brook, near Watertown, Mass., in memory of Norumbega, a Norse city which once existed here. Considerable research has been given to the matter, and some historians claim to have reasonable proof of the origin and location of what by many is considered a mythical city or a name applied by different explorers to different rivers and locations on the coast between Cape Breton and Florida. Consult: Fiske, 'Dutch and Quaker Colonies in America'; Horsford, 'Defenses of Norumbega'; and 'Discovery of Ancient City of Norumbega'; Beauvois, 'La Norambègue.'

Norval, Young, son of Lady Randolph and her first husband, Sir Malcolm Douglas, in Homes' tragedy, 'Douglas' (1757). He is reared in obscurity and his identity is revealed to Lady Randolph only after he has saved the life of his stepfather. Glenalvon, the latter's heir, jealous of Norval, incites Lord Randolph's jealousy against him and a duel ensues in which Glenalvon is killed and Norval dies immediately after, whereupon Lady Randolph flings herself from a precipice. The part was much favored by both Kemble and Macready.

Norwalk, nôr'wâk, Conn., city in Fairfield County; on the Norwalk River, near Long Island Sound, and on the New York, N. H. & H. R.R.; about 30 miles east by north of New York city and 12 miles west by south of Bridgeport. Steamers ply regularly between Norwalk and New York. It was settled in 1649, and in 1651 was incorporated as a town, which included what is now South Norwalk (q.v.). Norwalk was incorporated as a borough in 1836 and in 1893 was chartered as a city. In 1779 it was plundered and burned by a British force under Generals Garth and Tryon. The chief manufactures are silks, felt goods, air compressors, locks, hats, shirts, corsets, shoes, worsted goods, and machinery. The coastwise trade, the oyster interests, and the shipping of farm products engage the attention of a number. Norwalk has a State Armory, the Fairfield County Children's Home, and the Norwalk Hospital. The Carnegie Library and the public and parish schools are the principal educational institutions. The city owns and operates the waterworks. Pop. (1900) 6,135. Consult: Byington, 'Ancient and Modern Norwalk' in the 'Connecticut Quarterly,' Vol. I.; Selleck, 'Norwalk.'

Norwalk, Ohio, city, county-seat of Huron County; on the Wheeling & L. E. (main line, and also Huron branch), Lake Shore & M. S., and Cleveland & S. W. R.R.'s; about 56 miles west by south of Cleveland and 10 miles south of Lake Erie. Huron County is one of the 10 counties which composed the "Western Reserve" or the "Connecticut Reserve." (See WESTERN RESERVE.) The city is connected with a number of villages, and cities by electric railroad. It was

settled in 1816 by Platt Benedict, Elisha Whittlesey, and others; incorporated in 1828 and chartered in 1840. It is in a productive agricultural region, and has extensive manufacturing interests. The steel and iron works have 500 employees; piano factory, 400 employees; railroad shops, 400; printing works, 250; pyrography works, 150; canneries, 50; machine-shops, 100. There are a number of smaller industrial establishments each having from 5 to 20 employees. Norwalk has a large trade in its own manufactures and in farm and dairy products, fruit, and live-stock. It has a fine court-house, several well-built business blocks, and a number of handsome residences. The educational institutions are one central and four ward public schools, two parish schools (R.C.), and a Carnegie Library. There are 10 churches. The four banks have a combined capital of $250,000; the amount of the annual business is $1,350,000. The government is vested in a mayor, who holds office two years, and a council of six members chosen by popular vote. About three fourths of the population are native born, and the others are Germans and Irish. Pop. (1890) 7,195; (1900) 7,074; (1903) 10,250.

J. H. WILLIAMS,
Editor 'Norwalk Chronicle.'

Norway (Norwegian NORGE; Swedish NORRIDGE or NORRIKE, signifying North Kingdom), the western kingdom of the Scandinavian peninsula in the north of Europe, united since 1814 with Sweden (q.v.) so as to form the single monarchy of *Sverige och Norge* — Sweden and Norway, — and ruled since 1872 by Oscar II. Norway is bounded on the northeast by Russian Lapland, east by Sweden, and on all other sides by the sea, the Arctic Ocean being on the north, the Atlantic and the North Sea on the northwest and west, and the Skager-Rack on the south. From the Naze on the south, to a point adjoining the North Cape, the length southwest to northeast is about 1,080 miles; greatest breadth, measured nearly in the parallel of 60°, about 275 miles; area, 124,130 square miles. For administrative purposes Norway is divided into six provinces corresponding with the stifts, or dioceses, and subdivided into twenty bailiwicks (*amter*). The stifts are Christiania, Hamar, Christiansand, Bergen, Trondhjem, and Tromsö. Christiania is the capital.

Topography.— The coast consists for the most part of bold precipitous cliffs, and is remarkable for the vast number of islands by which it is lined, and the bays or fjords which narrow, deep, and winding, cut into it in all directions, providing an almost uninterrupted series of excellent natural harbors of refuge. Many of these fjords are deeper than the sea outside which averages 200 fathoms; Sogne Fjord, for instance is 2,820 feet deeper; Hardanger Fjord 930 feet; and Vest and Nord Fjords 840 feet. Some of these fjords penetrate great distances inland and send off numerous branching arms. The Sogne Fjord cuts its way to the foot of the Jotun Fjeld, 106 miles from the ocean, and Hardanger Fjord (q.v.) encircling the Folgefond is 68 miles long; the Justedal lies between the Nord and Sogne Fjords. These three are the most characteristic of the fjords and offer some of the most sublime and accessible scenery in Norway. The surface generally is mountainous, particularly in the west and north, the mountain masses, however, assuming the form of great plateaus or tablelands called fjelds, fields or fells, as the Hardanger Fjeld, Dovre Fjeld, etc. The main range, the Kjölen or Kell Mountains from 3,000 to 6,000 feet high, runs parallel to the coast from the plateau of Finmark in the north to 63° in the south and then divides, as the backbone of the peninsula forming the boundary with Sweden. The highest summits belong to the Sogne Fjeld, a congeries of elevated masses, glaciers, and snow fields in the centre of the south division of the kingdom, where rise Galdhöppingen 8,400 feet, the Glitretind 8,384 feet and Skagastölstind 7,879 feet. The line of perpetual snow ranges from 5,000 feet in the south to 3,000 feet in the north. In general the valleys are short and abrupt; and the streams, dashing down impetuously through rocky gorges, form numerous cascades. The leveler portions of plateau regions consist of dreary moors, covered in winter with snow and in summer with coarse grass and heather, studded with numerous tarns and forest belts of conifers, birches, willows, etc. The grass affords pasturage to the sheep and cattle of the dalesmen. The *sætre* or huts of the herd-girls and the wood-cutters are the only habitations in the mountain solitudes.

Hydrography.—The short distance from the western slope to the western coast gives rise to a great number of minor streams, which proceed directly to the shore or the fjords. On the eastern slope the streams do not properly assume the character of rivers till they have run a considerable part of their course in Sweden. The few important rivers of Norway have a southerly direction in accordance with the general slope already referred to, and discharge themselves into the Skager-Rack; of these the longest are the Glommen 350 miles, Drammen 163 miles, with its tributary the Hallingdal 113 miles, Nummedal Laagen 143 miles, and Otteren 140 miles. Some of these streams in their lower courses expand into long narrow lakes of considerable size: Lake Mjösen is 60 miles long, and its bottom is 1,080 feet below the level of the sea; others are Randsfjord (43 miles long), Tyrifjord (19 miles), and Fæmund (35 miles long and 2,300 feet above sea-level). The most important rivers in the north are the Tana, which forms part of the boundary between Russia and Norway, and falls into the Arctic Ocean; and the Namsen, which falls into the Atlantic.

Geology and Mineral Resources.— The prevailing rocks of Norway are gneiss and mica-slate, of which all the loftier mountains are composed. Granite is of comparatively rare occurrence. On some of the plateaus blocks of conglomerate occupy a large part of the surface. Porphyry, argillaceous schist, and limestone occur, but in very limited quantities, and rocks of volcanic formation are rare. Almost all parts of the country bear traces of the grinding action to which the structural rocks were subjected during the Glacial period. The minerals are numerous and abundant; the most important are iron, copper, silver, and cobalt, others are nickel, feldspar, and marble. For a century down to about 1870 the copper and iron mines of Röros and the silver mines of Kongsberg yielded considerable outputs; but have since declined. The principal mine is at Vigsnæs on Karmö, at the entrance to Bukken Fjord, which yields $300,000 worth of pyrites in the year. The total mineral

output of Norway, iron pyrites, silver, copper, apatite, nickel, was valued at $1,567,575 in 1900, showing an increase over preceding years. The silver mined was valued at $94,500. Barely 2,000 men are employed in this occupation.

Climate.— Known as "The Land of the Midnight Sun," one third of Norway lies within the frozen zone and the greater part between the same degrees of latitude as Greenland. It would in all probability be still covered with a similar ice-cap to Greenland, as it was in the end of the Tertiary period, were its shores, west and north, not washed by the Gulf Stream. It is mainly owing to this warm oceanic artery that Norway is habitable; its influence, together with the direction of the parallel mountain rampart, the distribution of the atmospheric pressure, and the presence of deep-sea banks off the coast, determines the predominant climatological features of the country. The isotherms do not run from west to east, but parallel to the coast. The harbors on the west are never blocked with ice; while in places more inland, though much farther south, as at Christiania, this regularly happens. Hammerfest, for instance, on the north coast, in lat. 70° 40′ N., has a winter mean of 22-6° F., 3° higher than Christiania, which has virtually an inland site, in lat. 59° 55′ N. In winter the west coast districts are the warmest, and the cold increases in intensity according to the distance inland; whereas in summer the reverse is the case, though altitude is then a more potent influencing factor than in winter. The places that have the lowest winter mean (11.8°) are all inland, as Elverum and Röros (Röraas), near the Swedish frontier, Kautokeino (in southern Finmark), and Nyborg (at the head of Varanger Fjord); at all these places the mercury has been known to freeze (—40° F.). The places which have the highest summer temperature are Christiania, the southwest extremity of the country, the heads of the western fjords, and the interior of Finmark. The prevalent southwest winds bring considerable rainfall, 40 to 70 inches in the year, to the west coast of southern Norway. In the interior only 12 to 16 inches fall during the year.

Flora and Fauna.— In general the mountain slopes up to a certain height are clothed with magnificent pine forests, and at lower elevations the oak and the beech are by no means uncommon. In the loftier altitudes, below the snow line, willows, lichens, and numerous wild berries — cranberries, raspberries, bilberries, and cloudberries — are found in summer. Among wild animals are the bear, wolf, lynx, fox, wild reindeer, and lemming; buzzards, kestrels, and owls prey on the smaller animals and birds; snipe, loom and teal abound in the lakes; lapwings and plovers breed in the tarns; in winter the ptarmigan is plentiful, and the eagle, sparrowhawk, woodcock, raven, and crow are common throughout the kingdom.

Forestry.— The forests cover about 26,300 square miles, of which 73 per cent are pine trees; 4,000 square miles are under state control. The area of late years has greatly diminished, but trees are being systematically planted in several parts, especially in the southern and eastern parts of the country. The trees are cut down principally in winter and floated down the streams in early spring to the sawmills at their mouths. The saw mills, wood pulp, and cellulose factories, give employment to about 12,000 people. The export of manufactured lumber in 1901 amounted to over $9,530,000, and of wood pulp over $6,400,000.

Fisheries.— The fisheries are of great value, and contribute mainly to the support of the inhabitants along the seaboard, from the Naze to the entrance of the White Sea. The fisheries are divided into three chief divisions — Lofoden, Romsdal, and Finmark. They include cod, herring, mackerel, salmon, shark, walrus, seal, and lobster fisheries, the cod and herring fisheries being by far the most important. Over 100,000 persons are employed in the fisheries, and the annual total value of the products of the fisheries considerably exceeds $5,000,000, more than two thirds of which is for cod. The rivers and lakes abound with salmon and salmon-trout, and make Norway one of the best angling countries in the world.

Land Tenure, Agriculture, etc.— The farms are generally the property of those who cultivate them, small proprietors being common in Norway. They often include a large stretch of mountain-pasture, perhaps 40 or 50 miles from the homestead, to which the cattle are sent for several months in summer. Among the crops cultivated for food the principal is barley, which ripens at 70°of latitude; rye is successfully cultivated up to 69°; oats to 68°; but wheat not beyond 64°, and that only in the most favorable seasons. Another most valuable crop is potatoes, grown with success even in Finmark. Some hemp and flax are also produced, and in the southern part of the country some tobacco is grown. Fruit, too, particularly the apple, pear, and cherry, is raised generally in all the lower localities of the south and the centre. The grain raised falls far short of the consumption. One of the most extensive and profitable branches of rural economy is the rearing of cattle, for which many parts of the country are well adapted. The breeds, however, are inferior. The milk of the cows, however, is good, and enters largely into the food of the inhabitants; and butter is produced in such quantities that there is a considerable export trade of that commodity. Sheep are less numerous than goats, and yield a coarse though abundant and warm wool; swine are not viewed with much favor. The horses are vigorous and sure-footed, but of diminutive size; the ponies are among the best of their kind, and are often exported. Another domestic animal of great value is the reindeer, which forms the principal stock of the northern provinces.

Commerce.— The export trade is chiefly confined to raw produce. The principal items are timber, with wood-pulp and cellulose; fish, smoked and dry, with ice, fish-oil, etc.; also copper ore, iron pyrites, lucifer matches, paper, etc. The chief imports are grain, bacon, and other provisions, coals, textiles, wool, cotton, hemp, salt, sugar, coffee, tobacco, wine, brandy, etc. This trade is chiefly concentrated in the towns of Bergen, Christiania, and Trondhjem, though Drammen, Stavanger, Christiansand, and Arendal likewise have a considerable share in the commerce of the country. During the latter half of the 19th century the foreign commerce of Norway more than quadrupled; in 1901 the exports amounted to over $41,400,000 and the imports to over $76,900,000.

CHRISTIANIA
And Vicinity.
SCALE OF MILES.
CHRISTIANIA
Botanical Gardens
Egeberg
Hoved Ö
NORWAY AND SWEDEN
SCALE OF MILES
0 20 40 60 80 100
Population of places is indicated by different lettering, thus:
150,000 and over STOCKHOLM
50,000 to 150,000 Bergen
25,000 to 50,000 Throndhjem
5,000 to 25,000 Sala
Smaller Places Kall
Railroads
ARCTIC CIRCLE
ATLANTIC OCEAN
NORTH SEA
GULF OF BOTHNIA
LOFODEN ISLANDS
VEST FJORD
Throndhjem
Trondhjem
Tromsö
Hammerfest
North Cape
Nordland
Sulitelma
Storm Field
Stor Borgé
Jaesohatten
Kolhaugen
Sarjentjekka
Kebnekaise
Haparanda
Torneå
Uleaborg
Brahestad
Jacobstad
Wasa
Gefle
Upsala
Stockholm
Christiania
Hoved Ö
Agershuus
Aker
Upper Fos
Lower Fos
Hasle
Bergs Kerdingen
Kongsbolig
Tonsen
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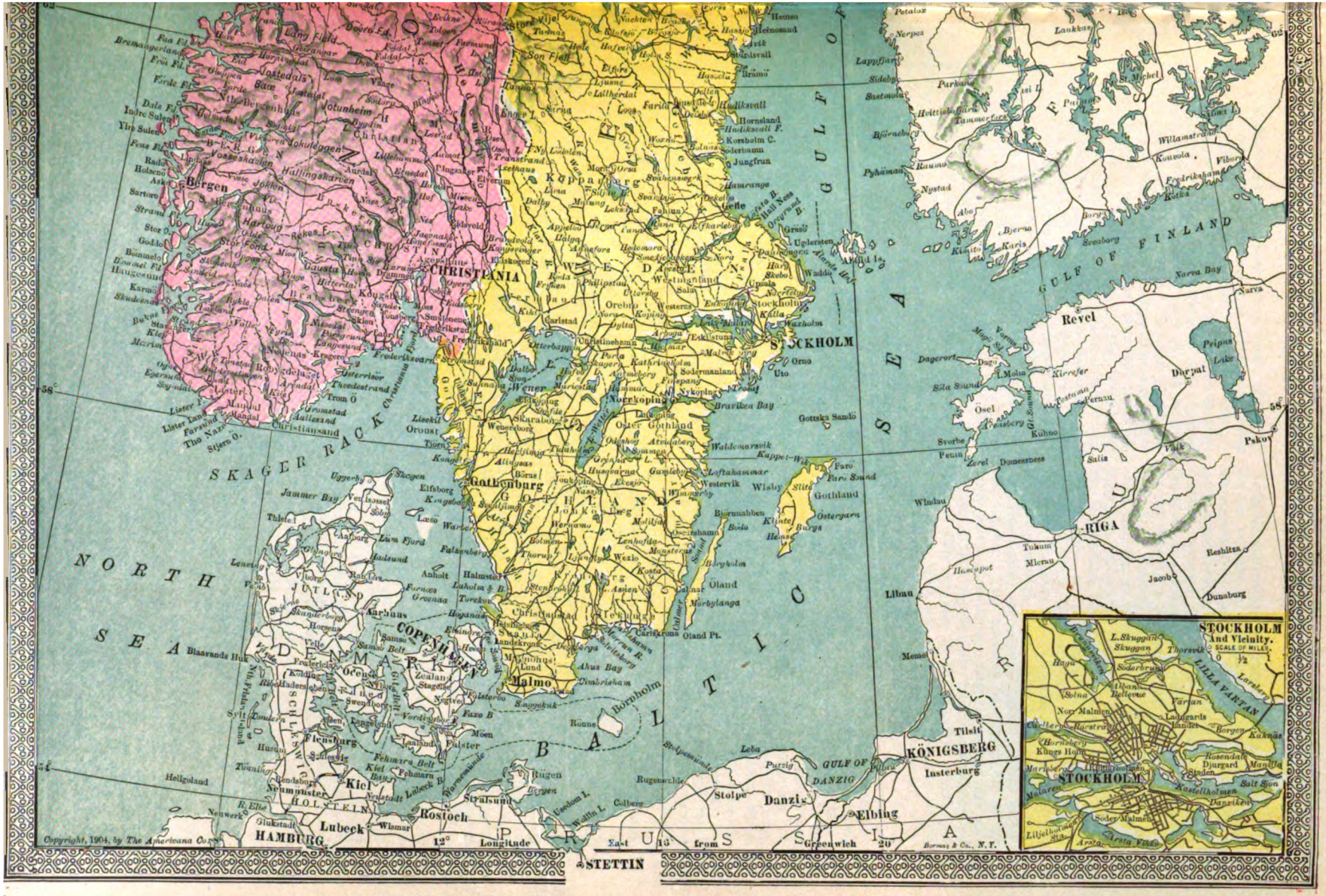
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Kaknäs
Hornsberg
Kungs Holm
Rosendal
Djurgard
Manilla
Malaren
Kastellholmen
Salt Sjon
Sodey Malmen
Liljeholmen
Stockholm
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Manufactures.— These have made comparatively little progress, but are increasing since the protective system adopted by the non-renewal of the customs treaty with Sweden in 1897. The purely industrial establishments are grouped mainly around Christiania, and do not employ more than 45,000 persons. Besides those already mentioned, the more important are textile manufactures, machine-shops, chemical factories, iron and metal works, brick-works, flour-mills, tobacco-factories, breweries, and in a minor degree tanneries, distilleries, and factories for matches, glass, oil (fish and vegetable), and paper. Water is the favorite motive power, only 500 out of 2,000 establishments using steam.

Shipping and Navigation.— For its population, Norway has a large mercantile navy, amounting in 1902 to 6,668 vessels (of which 1,223 were steamships), with an aggregate tonnage of 1,467,089. The Norwegians are among the busiest sea-carriers of the world, nearly 9,000,000 tons of merchandise being carried annually in their ships earning an aggregate sum of $30,000,000. Shipbuilding and supplemental industries are carried on chiefly at Christiania in about 150 establishments employing over 3,000 men. The Norwegian ports were entered in 1900 by 12,401 vessels of 3,110,878 tons and cleared by 12,031 vessels of 3,048,137 tons.

Railways, Communications, etc.— In 1901 there were 1,168 miles of railroad controlled by the state and 140 miles operated by private companies; there were also 8,072 miles of telegraph and telephone lines belonging to the state, and to the state and branch railways 1,563 miles; the national and communal roads had an aggregate length of over 15,000 miles; the principal means of communication, however, are steamboats, which ply along the coasts, on the fjords and inland lakes.

Weights, Measures, and Money.— The metric system (q.v.) of weights and measures was introduced in 1879 and became obligatory 1 July 1882. The unit of value is the Krone, equal to 100 öre, comparative value 27 cents; the 20 Kroner gold piece weighing 8.96 grams contains 8.0645 grams of fine gold, and the silver Krone weighing 7.5 grams contains 6 grams of fine silver.

Banking.— There are two state banks, the Bank of Norway — 'Norges Bank' and the 'Kongeriget Norges Hypothekbank' or Mortgage Bank of the Kingdom of Norway. The Bank of Norway, although a joint-stock bank, is largely owned by the state, is governed by state laws, and administered by directors elected by the parliament, excepting the president, who is appointed by the king. It is the only bank authorized to issue bank notes, and besides state business, is a general deposit, discount, circulation, and loan institution. Its assets in 1901 amounted to $26,578,926; its balance to $6,569,485. The 'Kongeriget Norges Hypothekbank' established by the state in 1852 to issue loans on mortgage, had in 1901 a capital of $4,690,000, and a reserve fund of $270,000. The loans on mortgage amounted to $36,159,560, and the bonds issued aggregated $34,062,671. Private banking was represented by 78 joint-stock banks with a paid up capital of $11,373,500, and there were 421 chartered savings banks, controlled by the minister of finance with over $86,290,000 on deposit and 695,524 depositors.

Government.— Norway being a portion of the Swedish monarchy, its finances, army, and navy do not require to be separately considered. By its constitution fixed at Eidsvold 17 May 1814; and subsequently, on the union of the two crowns, adopted, with some necessary modifications, in an extraordinary diet or *Storthing,* held on the ensuing 7 November at Christiania, Norway is a limited hereditary monarchy, united with Sweden as a free, independent, indivisible kingdom, under one common male sovereign, of the Evangelical Lutheran religion, declared to be the religion of the state. The king has the command of the land and sea forces, and makes all appointments; but, with the exception of the governor-general, is not allowed to nominate any but Norwegian subjects to public offices under the crown. The ministry is composed of at least seven councillors, most of whom are entrusted with a department; and two ministers of state. One of the latter, together with two councillors who are annually changed, reside with the king in Sweden; the remainder, with the governor-general, reside in Norway. On a new succession the sovereign must be crowned King of Norway at Trondhjem. The members of the legislative assembly, or, as it is called, *Storthing* (from *stor,* great, and *thing,* court), are elected every three years by the citizens possessing a certain qualification. It subdivides itself into two chambers — one consisting of one fourth of the members, and called the *Lagthing,* and the other of the remaining three fourths, and called the *Odelsthing.* These chambers meet separately, and each nominates its own president and secretary. Every bill must originate in the *Odelsthing,* but may be proposed either by the members or by the government. When carried in that court it is sent to the *Lagthing,* and thence to the king, whose assent makes it a law. If the *Lagthing* disapprove of the bill they must return it, with the reasons of disapproval, to the *Odelsthing.* If carried there again, with or without modification, it comes as before to the *Lagthing.* If the *Lagthing* reject the measure a second time the whole *Storthing* meet in one chamber, and the final adoption or rejection is determined by a majority of two thirds. The veto of the king becomes ineffectual against any measure which has been adopted without modification by three successive Storthings or parliaments.

Ethnology.— The Norwegians are almost entirely of Scandinavian origin. They are about the middle height, light-haired, and blue-eyed, sober and thrifty, honest and industrious, and where not devoted to a rural life have a strong passion for the sea, and make excellent sailors. The Finns or Lapons dwelling in Nordland, and more especially in Finmark, bear little resemblance to the Norwegians proper. The Qvaens, though dwelling in the same localities with the Finns, are very easily distinguished from them both by physical features and habits; being generally tall and well-proportioned, and remarkable for their cleanliness.

Population.— By the census of 3 Dec. 1900 the population amounted to 2,239,880, of whom 1,087,479 were males, and 1,152,401 females. Illegitimacy is somewhat high, averaging 8.5 per cent of the births. The Laps numbered 19,545, and Finns 7,767. The population is more rural than urban, only about one sixth living in the towns. There is comparatively considerable

emigration, the number in 1901 being 12,745, of whom 12,488 came to the United States.

Education.— Education is compulsory, and is conducted on a national system, according to which gratuitous instruction, of an elementary kind, is placed within the reach of all. The schools, designated by the name of *almue skoler,* or people's schools, are stationed in all towns and parishes. In the country the instruction is only elementary; in the schools themselves an important distinction is made, some being what is called *fast skoler,* or stationary schools, and others *omgangs skoler,* or ambulatory schools. The latter, as their name implies, shift about at certain periods of the year, from place to place in the more thinly-peopled districts; and thus have the effect of bringing education to those who, but for this arrangement, would be doomed to live without it. Towns possess, in addition to these people's schools, what are called middle schools, middle and royal schools, burgher schools, Latin or learned schools, in all of which superior instruction is given; there are also four cathedral schools, one each in the towns of Christiania, Bergen, Trondhjem, and Christiansand. At the head of all the educational establishments is the Royal Frederick University of Christiania, with five faculties, 63 professors, and 1,400 students. For *Language and Literature* see SCANDINAVIAN LANGUAGES AND LITERATURE.

Religion.— The great body of the people are Protestants of the Lutheran confession. Though no express law prohibited other religious bodies from meeting for public worship, the popular feeling was for long so decidedly opposed to it that a law, permitting them so to meet, and form regular congregations under their own pastors, was passed for the first time in 1845. In 1900 there were 52,680 dissenters, including 1,969 Roman Catholics. The country is divided into six bishoprics (stifts), corresponding in name and extent with the administrative provinces; and into 902 parishes. With exception of the cathedral of Trondhjem, founded 1180 or 1183 A.D., and a few other churches which are stone edifices, the churches in Norway are generally built of wood. Many of them are very ancient structures, dating as far back as the 11th and 12th centuries.

Judiciary.— Norway is divided into 108 districts for the administration of civil justice. Of these districts each with an inferior court, 26 are urban, and the rest rural courts, each with one chief, and two other judges, and a *Höiesteret,* or supreme court, for the whole kingdom, consisting of a president and a minimum of six other judges. In each town and district there is a *Forligelseskommission,* or court of mediation, consisting of two men chosen by the electors, before which civil cases are generally first brought.

History.— In the earliest times Norway was divided among petty kings or chiefs (jarls), and its people were notorious for their piratical habits (see NORTHMEN). Harold Fair Hair, who ruled from 863 to 933, succeeded in bringing the whole country under his sway, and was succeeded by his son Erick. He was ultimately driven from the throne, which was seized in 938 by his brother, Hako I., who had embraced Christianity in England. Magnus the Good, the son of Saint Olaf and Alfhild, an English lady of noble birth, was called to the throne in 1036; and having in 1042 succeeded also to the throne of Denmark, united both under one monarchy (see DENMARK). After his death the crowns of Norway and Denmark again passed to different individuals. In 1319 the crown of Norway and Sweden became for a short time united in the person of Magnus V. Erick of Pomerania succeeded, by separate titles, to Norway, Sweden, and Denmark; and in 1397 was crowned king of the three kingdoms. Sweden then for a time became a separate kingdom; but the union between Denmark and Norway was drawn closer and closer, and very much to the disadvantage of the latter, which was ultimately degraded into a mere dependency of the former. The subsequent history of Norway becomes for a long period a part of that of Denmark. After the defeat of Napoleon by the allies in 1813 it was arranged by the treaty of Vienna in 1814 that Denmark must cede Norway to Sweden, and the result was the union of the two countries under the Swedish crown. The union has been accompanied with a certain amount of friction, partly owing to the entirely democratic character of the constitution of Norway, in which country titles of nobility were abolished early in the 19th century. The right claimed by the king to veto absolutely bills passed by elected representatives met with an overwhelming protest by the people, the struggle lasting till 1884. More recently a grave constitutional struggle has arisen between the two countries, from the demand for greater independence for Norway in her foreign policy, which is energetically backed by the Liberals. A motion to introduce a purely Norwegian flag, without the symbol of union with Sweden, was carried by the Storthing, 11 Nov. 1898.

Bibliography.— Consult Bennett, 'Handbook of Norway' (1896); Boyesen, 'Norway' in 'Story of the Nations' (1900); Bradshaw, 'Norway, its Fjords, Fjelds, and Fosses' (1896); Chapman, 'Wild Norway' (1897); Du Chaillu, 'The Land of the Midnight Sun' (1881), and 'The Land of the Long Night' (1900); Keary, 'Norway and the Norwegians' (1892); Nielson, 'Handbook of Norway' (1899); Sedgwick, 'The Story of Norway' (1885).

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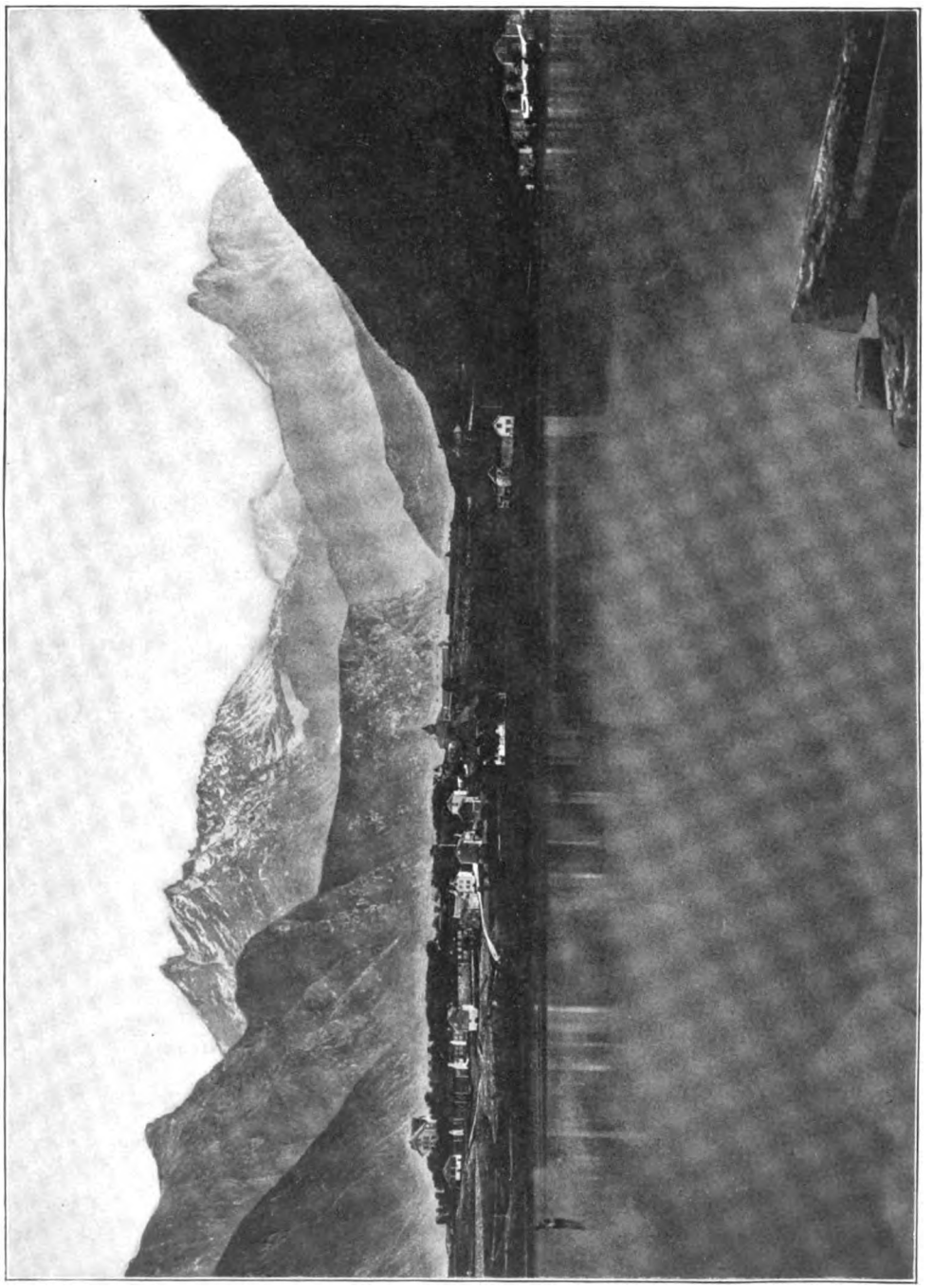
Norway Rat, the common house or wharf rat, called in England Norway or Hanoverian rat, because it was believed by some to have been imported from Scandinavia; and others to have first arrived at the time of the advent of the then unpopular Hanoverian royal family.

Norway Spruce, a spruce (*Abies excelsa*) which abounds in Norway where it is largely used in building. It is extensively grown in the United States as an ornamental tree. See SPRUCE.

Norwe'gian Lutheran College, situated at Decorah, Iowa. It was founded in 1861 under the auspices of the Lutheran Church. There is a preparatory department, besides the regular collegiate department. The degree of A.B. is conferred. In 1903 the value of the productive funds was $11,000; the annual income amounted to $6.800; the library contained 11,550 volumes. The students numbered 191, and the faculty 12.

Norwegian Stove, a square wooden box lined with a soft, non-conducting substance. The



VEBLUNGSNÆS AND ROMSDALS HORN.

interior is arranged for one or more saucepans, which, when inserted in the stove, are completely surrounded by the material. The meat or other substance in the saucepan being brought to the boiling-point in the ordinary manner, the pan is inserted in place in the stove, where, the radiation of heat being prevented by the lining, the contents remain at a boiling heat a sufficient time to insure their being thoroughly cooked. When used as a refrigerator, the lining prevents the access of warm air to the cooler object within. No heat is ever applied to the apparatus, which is designed merely to maintain the temperature of an object already heated.

Norwegium, nôr-wē'jĭ-ŭm, in chemistry, a substance isolated by Dahll from specimens of nickel-glance (gersdorffite) obtained from the island of Osterö, Norway, and supposed by him to be an element. The symbol Ng was provisionally assigned to it, and the atomic weight was determined as 219 or 146, according as the oxid is written Ng_2O_3 or NgO. Norwegium is said to resemble bismuth very closely, but it has been little studied, and its elementary character is not yet proved.

Norwich, nôr'wĭch, Conn., city, county-seat of New London County; at the junction of the Shetucket and Yantic rivers where they form the Thames, at the head of navigation on the Thames, and on the New York, N. H. & H. and the Vermont C. R.R.'s; about 14 miles from Long Island Sound, and 40 miles southeast of Hartford. It was settled in 1659 by a company of English from Saybrook, and the place was named after Norwich, England. It was incorporated as a township in 1685 and chartered as a city in 1784. Its surface is irregular and it is surrounded by picturesque valleys and hills. The land around is productive but its exceptional water-power advantages have contributed to the extensive development of manufacturing industries. The chief manufactures are firearms, leather, silk fabrics, cotton and woolen goods, machinery, stoves, iron and iron products, and furniture. There are about 50 manufacturing establishments which have a total of 5,000 employees. It has a large trade in its own manufactures, lumber, farm products, coal, and clothing and food supplies for the interior of western Connecticut. It is the industrial and commercial centre of a large portion of New London and Windham counties. The educational institutions are public and parish schools, the Free Academy, built and endowed by public-spirited citizens, the Art Museum connected with the Academy, and the Otis Free Library, which has about 30,000 volumes. The prominent buildings are the Slater Memorial Hall, the State Armory, State Insane Hospital, the William Backus Hospital, the Y. M. C. A. building, the court-house, and Saint Patrick's Roman Catholic Church. There are several good church buildings and a large number of handsome residences. The Indian burying ground which contains the grave of Uncas, the place where Miantonomoh fell, the ruins of colonial homes, the places where once lived the Huntingtons, and others prominent in Revolutionary times, are all of historic interest.

The five national and three savings banks have a combined capital of $1,600,000; the deposits (1903) are $24,226,592.73. The revised charter of 1877 provides for a mayor, who holds office two years, and a council of 12 members, six of whom are elected each year. The city owns and operates the waterworks. Pop. (1890) 16,156; (1900) 17,251. Consult Caulkins, 'History of Norwich.'

Norwich, nôr'ĭj, England, a city and civic county, capital of Norfolkshire, on the Wensum, where it joins the Yare, 98 miles northeast of London. It is a picturesque old town, and with its gardens and orchards covers a large area. The cathedral, founded in 1094, was originally in the Norman style, but now exhibits also later styles. It is a fine edifice with extensive cloisters, and a lofty tower and spire 315 feet high. The castle, a noble feudal relic, built by Uffa about 1066, is finely situated on a lofty eminence, and still surmounted by its massive dungeon tower in the Norman style. St. Andrew's Hall, originally the nave of the Blackfriars' Church, the Guildhall, and the bishop's palace, also are notable buildings. The literary and scientific institutions include the Norfolk and Norwich Library, with about 20,000 volumes; the museum, in the castle; a free library, containing 50,000 volumes; a school of art; and a new technical school. Manufactures, of which worsted and mixed goods are the staple, are extensive, including also mustard and starch, boot and shoe making, iron-working, brewing, etc. The foundation of Norwich cannot be fixed earlier than 446. Rising to the position of capital of the kingdom of East Anglia, it had, by the middle of the 10th century, become a large and wealthy town; but in 1002 it was laid in ashes by the Danes. Shortly after rebuilt by the Danes themselves, it had become in the 11th century a large and populous place. In 1296 it began to send representatives to Parliament. In 1328 Edward III. made it a staple town for the counties of Norfolk and Suffolk, and conferred upon it other privileges, and induced great numbers of Flemings to settle in it. A still greater number arrived during the reign of Elizabeth. Pop. (1901) 111,728.

Norwich, nôr'wĭch, N. Y., village, county-seat of Chenango County; on the Chenango River, and on the Delaware, L. & W., and the New York, O. & W. R.R.'s; about 45 miles in direct line south by west of Utica and 35 miles north by east of Binghamton. It is the industrial and commercial centre of a productive agricultural region. The chief manufacturing establishments are blast furnaces, railroad shops, furniture factories, ribbon and glove factories, machine-shops and creameries. There is manufactured here also perfumery, drugs, and patent medicines, and in the vicinity are stone quarries. It has a free public library containing about 12,500 volumes, a village hospital, the county buildings, and a number of fine residences. Pop. (1890) 6,524; (1900) 7,004.

Norwich, Vt., town, in Windsor County; on the Connecticut River, and on the Boston & Maine railroad; across the river from Hanover, N. H., and about five miles above White River Junction. It is in an agricultural region and its industrial establishments are connected with the farm products. It is the seat of the Norwich University (q.v.). Pop. (1890) 1,304; (1900) 1,303.

Norwich University, situated at Norwich, Vt. It was first chartered (1819) under the

name of American Literary, Scientific, and Military College and was situated at Middleton; in 1829 it was moved to its present site; and the name changed to Norwich University in 1834. The usual collegiate courses are offered; and in addition courses in civil and chemical engineering and military science; military drill is also a part of the curriculum. The chief work of the university has always been in science and engineering, and in 1898 it was made the official State military school, and receives a State appropriation. The degrees of bachelor of arts and bachelor of science are conferred. In 1902 the annual income amounted to $11,700; the students numbered 78, and the faculty 9.

Norwich Crested Canary. See CANARY.

Nor'wood, Mass., town in Norfolk County; on the New York, N. H. & H. R.R.; about 12 miles southwest of Boston. It has a large printing establishment, a railroad repair shop, foundry, tanneries, glue and ink factories, machine-shops, and furniture factories. The educational institutions are the Morrill Memorial Library which contains about 8,000 volumes and the public schools. The government is administered by annual town meetings. The town owns and operates the waterworks. Pop. (1890) 3,733; (1900) 5,480.

Norwood, Ohio, city in Hamilton County; on the Pennsylvania, the B. O. & S., the Cincinnati, L. & N., and the Norfolk & W. R.R.'s; northeast of and adjoining Cincinnati. It was settled in 1804, incorporated as a village in 1898, and chartered as a city in 1903. It is a beautiful residential hill-suburb of Cincinnati, and also a manufacturing city of considerable importance. The chief industrial establishments (1903) are playing-card factory, which has 2,200 employees; the elastic book-case works, 1,200 employees; electric manufacturing works, 1,000 employees; washing-machine factories, 600; foundry, 200; piano factory, 400; millwork works, 125; tool factory, 125; iron works, 150; enamel sign works, 50; lithography works, 250; and other establishments employing fully 1,000 men. Several of the manufacturing companies have buildings of considerable architectural merit. Other notable buildings are the town hall, Enterprise Block, Knights of Pythias Hall, the bank building and the eight churches. The educational institutions are five public schools (fine buildings), one parish school, and there are branch libraries of the Cincinnati public library. The First National Bank has a capital of $1,000,000. The government is vested in a mayor, a council of eight members, and a board of public service consisting of three members, all elected by the people. The population is mostly native born Americans, some are of German descent. Pop. (1900) 6,480; greatly increased in 1904.

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Nose, that part of the face of man and the higher animals which is included in the mechanism of respiration, containing avenues for the passage of air to the lungs, and which also contains and accommodates the organs of smell; in a broader and looser sense, the muzzle. The nose in most animals is the most prominent feature of the face — least so in monkeys and lemurs, not much prolonged in the cats, but an important part of the prolonged muzzles of other carnivora, and of the long-headed herbivorous animals generally. In several kinds of animals, otherwise widely diverse in structure and relationship, the fleshy part of the nose has been extended, through similarity of required service, into a more or less prolonged proboscis, as in the pigs, some shrews, certain seals, and, most prominently, the elephants. In these cases the nose performs other services than its usual functions, and becomes a tool for rooting, an organ of prehension, etc.

In structure, the nose consists of a series of bones of the face (see SKULL), together with certain cartilages, forming a tube or tubes holding the paired olfactory surfaces and nerves. The cavities of the nose are the two anterior nares, which open externally by the nostrils (in some of the lower animals, as the cetaceans, joined into a single one, the "blow-hole"); and the posterior nares, which are within the bones of the face and open interiorly into the mouth at the top of the windpipe. These cavities are separated by a more or less continuous cartilaginous partition called the septum, which is perforated by apertures for the transmission of blood-vessels and nerves. Occasionally the two nasal fossæ or cavities communicate with each other.

The muscles which are concerned in the movements of the nasal cartilages include the triangularis (or compressor) nasi, which arises by its apex from the superior maxillary bone, and is inserted into a fibrous aponeurosis spreading over the front ridge of the nose. The fibres of the muscle of one side may unite with those of the opposite and companion muscle. The depressor alæ nasi of each side also arises from the superior maxillary bone, and is inserted into the septum and posterior part of the alæ of the nose. The former of these two muscles appears to increase the breadth of the nose, and thus may open, dilate, or expand the nostrils; the action of the latter muscle is that of a true compressor of the nostrils, each of the depressors drawing its ala or side of the nostril downward. The levator labii superioris alæque nasi lies on the side of the nose, between the inner side of the orbit and the upper lip. When in action this muscle dilates the nose, raises the upper lip and alæ of the nose; its use being well seen in the expression of a derisive smile, and in the wrinkling of the skin at the angles of the nose and mouth.

The skin of the nose is of delicate and smooth character. The papillæ or minute elevations of the true skin in the neighborhood of the nose are described as being of smaller size than ordinary, while the supper skin or cuticle is of more than usually thin nature. The hairs of the skin are also of finer nature than in the other regions of the body; and the sebaceous or skin glands are very numerous, and possess short ducts, while their secretion is generally present in very abundant quantity.

There are three meati or compartments of the nose, which are formed in the outer wall or side of each of the nasal cavities by the turbinated bones. These compartments are of unequal size, and they communicate by apertures with certain spaces known as air-cells or sinuses, existing in the frontal, sphenoid, superior maxillary, and ethmoid bones. The upper or superior meatus is the smallest compartment, and occupies the posterior part of the nasal wall. It

communicates with air-cells known as the posterior ethmoidal and sphenoidal sinuses. The middle meatus is a little larger. It communicates anteriorly through a passage or infundibulum with the anterior ethmoidal and frontal sinuses. The inferior meatus is the largest cavity, and occupies the greater part of the outer nasal wall. Into the front portion of the inferior meatus the nasal duct opens; this canal conveying the tears or lacrimal secretion from the eye to the nose. (See EYE.) Posteriorly to the extremity of the inferior meatus the aperture of the Eustachian tube, leading from the ear, may be seen.

The mucous membrane lining the nostrils and nasal cavities is also known as the pituitary membrane. It extends throughout the nasal sinuses, into the pharynx, into the nasal ducts and orbits, and through the Eustachian tubes, into the tympana and mastoid cells of the ear. (See MUCOUS MEMBRANE.) In the upper part of the nose, corresponding to the upper and middle turbinated bones and the ethmoidal portion of the septum — and termed the olfactory region, from the distribution at this part of the olfactory nerves — the mucous membrane has a covering of epithelial cells of the columnar variety, but non-ciliated. And beneath this layer, and also between the columnar epithelial cells, nucleated or olfactory cells are found. These latter cells form the terminal points as it were of the delicate ultimate filaments of the olfactory nerves, or the nerves of smell (see NOSE AND THROAT); and in this way the odoriferous particles drawn into the nostrils, and brought in contact with these cells, stimulate through them the olfactory nerves, and produce the sense or impression of smell.

The study of the comparative anatomy of the nasal organs shows us that man possesses a sense of smell greatly inferior in very many instances to that possessed by the lower animals. The distribution of the olfactory nerves in man is of a very limited nature when compared with what obtains in such animals as the dog, sheep, etc. And among these lower forms great differences are apparent in the kinds or qualities of odors most readily perceived or appreciated. The carnivorous mammals will in this way be most susceptible to the odors of other animals, and the herbivorous forms to those of plants.

Nose and Throat, Diseases of. In treating of the various aspects of the subjects here naturally combined, attention is first drawn to matters of anatomical structure, and the parts first presented for consideration are the anterior nasal cavities. These cavities mark the commencement of a continuation of passages which extend from the external orifices of the nose to the lungs. These are subdivided into anterior nares, nasopharynx, pharynx, and larynx. This series of continued passages constitute what is known as the respiratory tract. (See RESPIRATION.)

The anterior nares are the two nasal cavities (nostrils) separated by the nasal septum. The septum also serves to define this space, since its posterior border marks the dividing line between the anterior and posterior nares. Each naris consists of a nearly horizontal floor, an internal or septal wall, and two side walls tending to converge in the upper portion, leaving a narrow and irregular roof. The external wall serves as an attachment for the series of the three turbinated bones.

Turbinated Bones.— These are scroll-like processes of bone attached to each lateral wall of the nasal cavity, one over the other, and projecting well into the lumen of the cavity. In the order of location they are known as the superior, middle, and inferior, the inferior being the largest and the longest of the three. The spaces between these bones, looking antero-posteriorly, are known as the superior, middle, and inferior meatuses.

The Nasal Septum.— The septum divides the anterior nasal cavity antero-posteriorly. It is partly cartilaginous and partly bony, the bony portion being made up of processes of the ethmoid bone and the vomer.

Accessory Sinuses.— Four groups of accessory sinuses communicate with the anterior naris. They are in pairs and are named as follows: The maxillary sinuses or antra of Highmore, the frontal, the ethmoidal, and the sphenoidal. The maxillary sinuses are situated one in each superior maxillary bone, for the most part occupying the space in the prominence of the cheek. They are irregular cavities, rather pyramidal in shape. The roof of the sinus constitutes the floor of the orbit, its floor being the alveolar process. Occasionally the teeth project into this cavity. The maxillary sinus opens into the nasal cavity in the middle meatus through a small tortuous canal, known as the ostium maxilliare.

The frontal sinuses are located between the two tables of the skull, just over the orbit, and give rise to the prominence over each eye. They communicate with the nose.

The ethmoidal, better named ethmoid cells, are in series, and are located in the middle anterior and posterior portions of the ethmoid bone. These open into the nasal cavity.

The sphenoidal sinuses are located in the body of the sphenoid bone. They are each about the size of a bean, and open into the superior meatus. The opening of the lacrimal or nasal duct which leads from the lacrimal sac to the nose is in the anterior portion of the inferior meatus. The bony walls of the anterior nares together with the sinuses above described are completely covered by mucous membrane. This membrane is richly supplied with blood-vessels, lymphatic nerves, and glandular structures. The olfactory nerves descend through the cribriform plate of the ethmoid bone and cover the upper surface of the septum, the superior and middle turbinated bones. Most physiologists regard the function of the nasal cavities as three-fold in character, relating to respiration, olfaction, and phonation. The secretions are supposed to have a bactericidal power.

Rhinoscopy.— This term denotes the methods used for examining the nasal passages, either through the anterior nares or the post-nasal space. The examinations may be made by direct or by reflected light. Various methods have been employed, the commonest being the student-lamp or ordinary gas-jet, with McKenzie's bull's-eye condenser. This, together with a reflecting head-mirror, enables the examiner to throw a light directly into these cavities. An electric head-light which does away with the use of a burner or indirect apparatus may be employed. When an anterior naris is examined the nostril is opened wide by the means

of a nasal speculum. For examining the posterior naris a tongue-depresser and small hand-mirror must also be used.

Catarrh.— The term catarrh is used quite generally to designate the varieties of inflammation of the upper respiratory tract. This is contrary to the strict meaning of the term. It may, however, be used to define certain varieties of inflammation, which are no less distinctly recognized.

Inflammation.—The varieties of inflammation in the nasal cavity include: 1. Catarrhal inflammation, of which the acute variety is a simple inflammation of the nasal mucous membrane resulting from irritants, exposure to cold, or from infections (measles, scarlet fever, typhoid, diphtheria, grip, etc.), while rheumatism and gout sometimes induce catarrhal inflammations of the upper respiratory tract. Chronic catarrhal inflammation may result from a series of acute attacks, but is more particularly found as a local indication of systemic diseases such as syphilis, Bright's disease, gout, rheumatism, malaria, etc. 2. Membranous inflammation, of which there are three varieties: (a) croupous or pseudomembranous, an exudate without material organization and not due to specific bacteria, and which may be produced by escharotics or infectious fevers; (b) fibrinoplastic inflammation, which is characterized by the formation on the surface of the membrane of plastic material that seems to organize in layers, but is nonbacterial in origin; (c) diphtheritic inflammation, a more deep-seated exudate due to a specific germ, the Klebs-Löffler bacillus, or *Bacillus diphtheriæ.*

Unlike the foregoing this false membrane when removed leaves a bleeding surface, showing that ulceration exists, which extends at least through the basement membrane.

3. Hemorrhagic inflammation, a violent inflammation of the mucous surface, characterized by interstitial hemorrhage.

4. Gangrenous inflammation, a type of inflammation which sometimes follows the acute infectious diseases in children. It may be due to burns, scalds, etc.

Specific Inflammations (Chronic Infectious Inflammations; Specific Granulatoma).— These include actinomycosis, glanders, leprosy, syphilis, tuberculosis (qq.v.), and rhinoscleroma, which is characterized by excessive thickening and swelling of the skin and mucous membrane of the nose, and is supposed to be due to *Bacillus rhinoscleromatis.*

Nasal Bacteria.—Owing to the peculiar construction and functions of the nasal cavities, together with the moist condition of the membrane, bacteria to a greater or less extent accumulate. The secretions of the nose and nasopharynx are supposed by most bacteriologists to possess considerable germicidal influence, as may be instanced by the fact that they are found in much larger numbers in the anterior nares than in the rhinopharynx. It may also be noted that even the more virulent types, especially the *Staphylococcus pyogenes, Micrococcus pneumoniæ* (Frankel), *Bacillus tuberculosis,* Friedlander's pneumococcus, Klebs-Löffler bacillus (diphtheritic), and the streptococcus may be found and still not result in the development of the specific diseases of which they are supposed to be the causative factors.

Diseases of the Anterior Nasal Cavities.— Of these one of the most frequent is acute rhinitis (acute nasal catarrh, acute rhinorrhœa, catarrhal rhinitis, cold in the head, snuffles), an acute inflammation of the lining membrane of the nasal cavities, supposed to be the result of lowered vitality, confinement in overheated rooms, and prolonged mental strain, to which is added exposure to draft or sudden chilling of the body. Contributing causes may also be mentioned, such as deviation of the cartilaginous septum, stenosis, rheumatism, gout, chronic hypertrophy, and unsuitable clothing. Irritant drugs, the inhalation of dust, clippings, etc., may be considered as exciting causes.

Simple chronic rhinitis (chronic blennorrhœa, chronic nasal catarrh, chronic coryza, chronic rhinorrhœa) is a chronic inflammation of the nasal mucosa characterized by infiltration of the tissues and resulting from changes in the secretions and repeated acute attacks. In its hyperplastic form, owing to the increase of connective tissue in the nasal mucosa, it is accompanied by more or less nasal obstruction.

Ozena.— This is usually spoken of as a disease, but in reality is only a symptom. The conditions giving rise to its characteristic stench are not fully understood. By some it is considered to be simply a decomposition of the various fatty acids set free from certain intranasal inflammations. A more generally accepted opinion, however, is that the retained altered secretions undergo a putrefactive process as a result of the presence of saprophytic bacteria. The conditions usually present in the nose are those of atrophy and disease of the accessory sinuses. The odor is mainly confined to the large masses of crusts imbedded in the nasal cavities.

Atrophic Rhinitis.— This disorder, also known as atrophic catarrh, dry catarrh, dry rhinitis, fetid rhinitis, nasopharyngitis, ozena, and rhinitis sicca, may be described as atrophy of the nasal mucous membranes, accompanied by lessening of both the blood-supply and glandular secretion. The atrophic state has usually been preceded by a succession of inflammations accompanied by more or less hypertrophy of the tissues. In a large proportion of atrophic cases ozena is present.

Purulent rhinitis is a rare condition resulting from direct infection, and often mistaken for purulent conditions of the accessory cavities.

Nasal hydrorrhœa is an obstructed nasal condition accompanied by an excessive flow of watery fluid from the nose, probably of reflex origin.

Nasal Syphilis.— A disease also called specific catarrh, specific rhinitis, and syphilitic rhinitis. It is an intranasal manifestation of syphilis, usually of the tertiary variety, accompanied with more or less necrosis of both soft tissues and bone. Occasionally the nasal mucous membrane may become the seat of the initial lesion. The intranasal lesions of the tertiary stage are severe and extensive and may involve the cartilaginous septum or the bony framework of the nose, resulting often in serious and extensive deformity. Wherever there are masses of necrosed bone the odor is exceedingly offensive, and frequently large pieces of broken down bone may be removed *en masse.*

Lupus (q.v.) is a skin-disease of which there are two distinct forms.

Furunculosis (phlegmonous rhinitis) is the

formation of abscess in any part of the nasal cavities.

Ulcers.— Small ulcers may form in various portions of the nasal cavity, but are usually found upon the septum, and result from foreign bodies, picking of the nose, and from a general systemic disturbance like diabetes. Malignant growths occur in the nose and do not differ essentially from those found elsewhere in the body. Infected ulcers, when occurring in nasal cavities, are due to some specific form of disease like syphilis, glanders, diphtheria, scarlet fever, smallpox, typhoid fever, or typhus fever, the type depending upon the nature of the accompanying disease.

Neuroses.— Neurosis of olfaction (smell) is a perversion of olfaction, a perception of imaginary odors frequently amounting to hallucination. Hyperosmia, overacuteness of olfaction, is supposed to be due to impairment of nerve-force. See ANOSMIA; SMELL.

Sneezing is a forcible and audible spasmodic expulsion of air through the nose and mouth caused by inhalation of irritating substances or by irritation of the vasomotor centres. See HAY FEVER.

Non-Inflammatory Diseases.— Of these, one of the most common is nosebleed (q.v.). Several varieties of foreign bodies are occasionally found in the anterior nasal space. Rhinoliths are developments of hard substances in the nasal mucosa formed from the deposit of mineral salts. Various animate foreign bodies may be found in the nose, such as insects, maggots, and intestinal worms. Of other foreign bodies, those placed in the nostrils by malingerers and children form the greater part, and consist chiefly of buttons, beans, peas, seeds, rags, etc.

Neoplasm of the Upper Respiratory Tract.— Non-malignant neoplasm (papilloma) is a benign wart-like growth made up of hypertrophied papillæ, appearing rarely in nasal cavities, but occasionally seen in the pharynx and larynx. Adenoma is a benign tumor made up of connective tissue enclosing a large space filled with blood. Enchondroma in the nasal passages, is a cartilaginous growth, sometimes called chondroma, and is an offshoot from the cartilaginous septum. Exostosis is a bony growth projecting outward from the surface of the intranasal bony framework. Myxoma (nasal polypus) is the lowest grade of adult connective-tissue tumor; being a soft translucent growth made up of connective tissue and capillary vessels enclosed in a jelly-like matrix. They are usually pedunculated, multiple, and sometimes of large size; grayish in color, translucent, and have a small surface. They give rise to symptoms of intranasal pressure and obstruction, asthma, laryngeal cough, impairment of smell, and excessive watery discharge. As a rule the growth is associated with diseases of the accessory sinuses.

Malignant Tumors.— Carcinoma may have its origin in any part of the upper respiratory tract. It rapidly assumes grave proportions, and is amenable to operative interference only during incipiency. The same may be said of sarcoma, which is a highly malignant tumor, having its origin in the deep connective tissue and gradually spreading to the mucous surface. It is nodulated and fungoid in appearance and tends to ulcerate in the later stages. See TUMOR.

Diseases of the Anterior Nasal Cavities.— Owing to the prominence of the nose and its peculiar anatomical conformation, the septum becomes peculiarly liable to injuries and malformations, the most common of which is deviation or deflection. A deviated or deflected septum (usually limited to the cartilaginous portion) is a permanent change from the perpendicular to varying deformities. The deformities assume various shapes, with an occasional offshoot of a cartilaginous mass heretofore described as enchondroma. These often result in severe intranasal obstruction and require radical operative interference for relief. Synechia is a cartilaginous or fibrinous band extending from the septum to the nasal wall. A synechia may sometimes form between the turbinals. Septal ulcerations are usually due to picking the nose, the desire for which may be induced by irritants, foreign bodies, and the inhaling of poisonous gases. They may also be syphilitic in origin. Septal perforations are openings through the cartilaginous septum. They are of varying sizes, and are due to extension of ulceration. Abscess of the septum is a collection of pus in the septal tissues, due to injuries or general systemic diseases. Depression of the nasal cartilage is a nasal deformity following extensive loss of septal tissue or of nasal bones, usually due to syphilis or injury.

Diseases of the Accessory Sinuses.— The maxillary sinuses are occasionally the seat of purulent inflammation, which may be acute or chronic. The collection of pus gives rise to pain, a sense of fulness, and discharge into the nasal cavity of the affected side. The condition is caused either by carious teeth, infectious rhinitis, or from the introduction of infection through abnormal communications from other diseased sinuses.

Transillumination is a method of diagnosis of antral disease, by means of which, having the patient in a dark room, a strong electric light is placed in the mouth and a comparison of the illumination made with the opposite side. Acute cases frequently recover by local treatment, but chronic cases usually require operative measures. The antrum may also become the seat of both benign and malignant growths.

Diseases of the Ethmoidal Cells.— These groups of cells, located in the ethmoid bone and communicating with the nasal cavities, are subject to both acute and chronic inflammatory and purulent diseases, the most common being the acute catarrhal inflammation occurring with general purulent rhinitis. The purulent form may occur on one or both sides, and may be associated with a suppurative condition of other accessory sinuses. When far advanced, it results in an enlargement of the middle turbinated bones, the walls of which become cystic, forming, with the broken-down tissues of the ethmoid, large cysts filled with pus or polypoid degeneration.

The sphenoidal sinuses are less frequently the seat of disease, although they may be the seat of the same diseases heretofore described as occurring in the other sinuses.

The anatomical relation of the frontal sinuses to the nasal cavities renders them liable to the development of both acute and chronic inflammatory conditions, purulent infections, and tumors.

Catarrhal inflammation, both acute and chronic, with its attendant supra-orbital pain and sense of weight and fulness in the fore-

head, is occasionally present in connection with the same condition in the nasal cavities. Acute suppurative inflammation (empyema) is an acute suppuration brought about by the introduction of infection from the nose through the infundibulum. When long continued, the purulent process takes on the form of chronic purulent inflammation, in which there may be more or less necrosis of the bony walls and the development of polypoid degeneration. The severest forms are usually quite curable by means of operation.

Nasopharynx.— The nasopharynx is that section of the upper respiratory tract between the posterior border of the vomer and the level of the soft palate. The nasopharynx may be the seat of the following diseases: (1) acute nasopharyngitis (acute postnasal catarrh, acute rhinopharyngitis); (2) chronic nasopharyngitis; (3) atrophic pharyngitis (see *Atrophic Rhinitis* above); (4) hyperplastic nasopharyngitis; (5) specific inflammations (see *Pharynx* below, also PHARYNX, a separate article); (6) adenoid vegetations (see *Tonsils* below).

Acute nasopharyngitis is an acute inflammation of the mucous membrane lining the nasopharynx, usually accompanied by similar inflammations in the nose, pharynx, and larynx. Chronic nasopharyngitis is a chronic catarrhal inflammation resulting usually from repeated acute attacks and with the same causal relations. It is characterized by the presence of tenacious mucus, with more or less continuous efforts on the part of the victim to "hawk" and clear the throat. In the later stages the secretion shows a tendency to become thick, forming scabs and inspissated masses. This affection may result from the inflammation of irritating gases. Hyperplastic nasopharyngitis is a chronic inflammation resulting in the development of connective tissue in the mucous membrane.

Pharynx.— The pharynx is that portion of the upper respiratory tract bounded above by the soft palate and below by the upper borders of the larynx and œsophagus. The uvula, when normal, should be about ⅜ of an inch long. It is occasionally bifid, and when it is greatly relaxed or enlarged the condition is described as elongation of the uvula. The uvula may be subject to inflammations, ulceration, tuberculosis, syphilis, and œdema. The same may be said of the soft palate, which is also subject to adhesions, in which there is an attachment or adhesion between the soft palate and the posterior wall of the pharynx. Adhesions of this character are due to the ravages of syphilis.

Tonsils.— The tonsils are a series of glands known as (1) the pharyngeal or Luschka's tonsil, also called adenoid vegetation; (2) the faucial tonsils, located on either side of the pharynx between the faucial pillars; (3) the lingual tonsils, a series of glands at the base of the tongue. Taken as a whole, they have been known as Waldeyer's ring. A visible hypertrophy or enlargement of any one of the series is usually accompanied by similar enlargement of the others. They form a part of the normal anatomical structures of the locality and, when diseased, call for operative interference.

Adenoid vegetation in the vault of the pharynx is an enlargement or hypertrophy of the glandular structures of the vault, due to disease. The presence of this condition is indicated by interference with nasal respiration, resulting in mouth-breathing, especially at night, snoring, restlessness, "dead" voice, and often with considerable arrest in the progress of physical development. With these symptoms are frequently found narrowing of the nasal orifices, attacks of middle-ear suppuration, and narrowing of the chest-walls. The causes are variously described as climatic, inherited tendency, confinement in badly ventilated quarters, and neglect. The masses are found in the vault and on the posterior wall of the nasopharynx. Enlargement of these glands is considered to be extremely detrimental to child-life, and complete removal by operation offers the only means of cure and should always be done.

The faucial tonsils are located between the anterior and posterior faucial pillars, and normally are not visible to the eye. The lymphatic structure, however, is liable to pathological changes resulting in enlargement or hypertrophy. The enlargement may be slight, but the tonsils may become so much enlarged that they meet in the median line of the pharynx. The enlargement becomes much aggravated during the attacks of the various acute inflammations which may occur in this region. The faucial tonsils are subject to acute inflammation occurring with general pharyngitis.

Tonsillar and peritonsillar abscess (quinsy, phlegmonous tonsillitis) is a suppurative inflammation of the tonsil, accompanied by severe pain, fever, and swelling in the tonsillar or peritonsillar region, resulting in formation of abscess.

Follicular tonsilitis (lacunar and cryptic tonsillitis) is an acute inflammation of the tonsil attended with small fibrinous exudates in the crypts. It is accompanied by constant pain, chills, high temperature, and is supposed to be due to exposure to cold, climatic changes, and lowered vitality.

The causes of hypertrophied tonsils are chronic inflammation, inherited diathesis, gouty or rheumatic conditions, climatic influences, and the infectious diseases of childhood. The condition is accompanied by interference with respiration, more or less difficulty in swallowing, involvement of the Eustachian tube, anæmia, languor, and retarded physical development, all these symptoms being aggravated by the recumbent position. Tonsillotomy should be performed whenever there is sufficient enlargement to interfere with deglutition, respiration, or phonation. The instrument generally used for the removal of hypertrophied tonsils is known as the tonsillotome.

Caseous tonsillitis is a condition resulting from acute or chronic inflammation of the tonsils, in which the crypts show a tendency to fill up with various secretions. These masses show a tendency to ferment and form small foul-smelling caseous masses, which eventually squeeze out of the crypts. They may be removed by the means of a curet.

Mycosis of the tonsil and pharynx is an affection characterized by the development of small yellowish-white, clearly defined masses forming around the tonsillar crypts and frequently extending over the surface of the pharynx and the glands at the base of the tongue. It is supposed to be caused by *Leptothrix buccalis.*

Fish-bones, pins, and other foreign bodies occasionally find lodgment in the tonsil-crypts.

Lingual tonsil is made up of a mass of

adenoid tissue located between the circumvallate papillæ at the base of the tongue and the attachment of the epiglottis.

Disease of the Pharynx (acute inflammatory diseases of the pharynx, acute catarrhal pharyngitis), an inflammatory process, catarrhal in character, results from exposure to cold, and is usually attended with a like condition in the nose and larynx. It may also be due to gastric disorders and lowered vitality. There are many contributing causes, among which may be mentioned the exanthemata, bad ventilation, bad hygiene, insufficient clothing, overindulgence in alcohol and tobacco, and the inhaling of noxious gases. The disease is indicated by a certain dry painful condition of the pharyngeal walls, congested vessels, swelling, and sometimes œdema. Later on the dryness gives way to a more or less profuse secretion gradually becoming more tenacious and mucopurulent.

Infective pharyngitis (hospital sore throat, phlegmonous pharyngitis) is an inflammatory condition, attended with more or less exudate, occurring in individuals who are exposed for a prolonged period to septic influences. It is frequently found in the throats of physicians and nurses who care for diphtheria and scarlet-fever patients.

Croupous or simple membranous pharyngitis is an inflammation of the pharynx or tonsils attended with the development of a false membrane without the presence of any specific germ. Clinically the disease resembles diphtheria, but is in no sense to be considered as the same. (See DIPHTHERIA). A positive diagnosis can be established only by bacterological examination.

Ludwig's Angina.— This is a suppurative cellulitis occurring in the tissues of the neck, due to secondary infection from within the throat. Diphtheria, scarlet fever, and grip may be mentioned as exciting causes.

Chronic Inflammatory Diseases.— Simple chronic pharyngitis (clergyman's sore throat) is an inflammation of the pharynx resulting either from frequent acute inflammations or from overuse of the voice. Public speakers and singers are peculiarly liable to its development. It may also result from lesions of the liver, kidneys, lungs, and heart, or from the use of stimulants. The marked symptoms are hyperæmia or congestion, with dryness, hoarseness, and a feeling of throat-tire.

Follicular pharyngitis (granular pharyngitis) may be defined as an inflammation in which the granular structures of the pharynx become chiefly involved. It is accompanied by hoarseness, irritation, and cough, together with the appearance on the posterior wall of small granular enlargements. The disease is supposed to result either from voice-strain or improper vocalization.

Atrophic pharyngitis (dry pharyngitis, pharyngitis sicca, atrophic pharyngitis) may be defined as a chronic inflammation resulting in pathological alterations in the structure of the mucous membrane of the pharynx and impairment of the muciparous glands. The disease is attended therefore by perverted secretion, with a burning, itching sensation in the throat, and extreme dryness. It is usually accompanied by atrophy of all the membranes of the upper respiratory tract.

Rheumatic pharyngitis (gouty sore throat, rheumatic sore throat) is an affection that may be acute or chronic, and is due to the presence of some irritant in the blood. The uric-acid diathesis may be considered an exciting cause, and the disease responds to antirheumatic or antigout treatment.

Tuberculosis of the pharynx is a rare involvement, always secondary to pulmonary tuberculosis. Its presence is indicated by the formation of small tubercles upon the soft palate or pillars of the fauces. A positive diagnosis may be made by microscopical examination of the secretions.

Syphilis.— All three forms of syphilitic lesions may appear in the pharynx. The primary lesions are occasionally found upon the tonsils or other surfaces of the pharynx in the form of chancre. The mucus-patch is usually present at some period during the history of every case. The tertiary lesion or gumma may also develop in any of the pharyngeal structures often resulting in extensive ulceration and adhesion.

Glanders.— An infectious disease due to the *Bacillus malles,* and communicated to man from animals, usually horses.

Retropharyngeal Abscess.— A suppurative inflammation in the posterior wall of the pharynx resulting in the development of abscess, which may burrow upward or downward, causing serious danger to life. The primary infection is usually due to inherited tuberculosis or syphilis.

Foreign Bodies in the Pharynx.— The exposed location of the pharynx, with its irregular surfaces, renders it peculiarly liable to the lodgment of foreign bodies. Among those rather frequently observed are fish-bones, pieces of other bone, shells, coins, pins, needles, sharp objects of various kinds, false teeth, etc.

The Larynx.— That section of the upper respiratory tract which occupies the space between the root of the tongue and the upper end of the trachea is called the larynx (q.v.). It is subject to a variety of diseases, among which are malformations and deformities. Congenital deformities in the larynx are rare. Congenital stenosis is a narrowing of the calibre of the larynx due to the formation of webs or bands stretching across the interior. Acquired stenosis is due to cicatricial contraction, traumatism, or syphilis. Tubercular ulceration may also be mentioned as a cause of stenosis of the larynx.

Acute catarrhal laryngitis (spurious croup) is an acute inflammatory process involving the mucous membrane of the larynx, and attended with hoarseness, dryness, and slight dyspnœa. The disease is caused by cold, exposure, gastro-intestinal disturbances, nasal obstruction, bad ventilation, inhalation of irritating gases, and overuse of the voice. There is usually slight fever, cough, and in the later stages considerable expectoration.

Acute laryngitis in children (spasmodic croup, false croup) does not differ in etiology and pathology from ordinary acute laryngitis. The symptoms, however, are much more marked. The small calibre of the larynx in childhood, together with the greater elasticity of the tissues, renders the condition more serious. The engorgement is more rapid, and the symptoms of suffocation rapidly develop. The peculiar stridulous breathing, with frantic respiratory efforts and a hoarse barking cough, gives the disease an appearance of unusual severity.

The disease usually continues for three days, and is relieved by steam-inhalations, emetics, and laxatives.

For spasm of the glottis see LARYNGISMUS STRIDULUS.

Acute epiglottiditis, inflammation of the epiglottis, is rarely entirely local except when due to swallowing an irritating substance. It is usually associated with inflammation of contiguous membranes. The chief symptom is a burning, smarting sensation, with a tendency to œdema.

Œdema of the larynx is an acute inflammation of the larynx accompanied by serous infiltration of the tissues, and resulting in marked interference with respiration.

Rheumatic laryngitis (laryngeal rheumatism, gouty sore throat) is an acute laryngitis directly traceable to a rheumatic or gouty diathesis.

Membranous laryngitis (true croup, membranous croup, diphtheritic croup, fibrinous croup, croupous laryngitis, laryngeal diphtheria) is an inflammation of the mucous membrane lining the larynx, manifesting the appearance of true diphtheria, but usually without the presence of Klebs-Löffler bacilli. Various forms of pathogenic bacteria are usually present. It may occur at any season of the year, and clinically it approaches so nearly to diphtheria that a positive diagnosis is most difficult. Many observers believe the condition to be exceedingly rare, and that true diphtheria is nearly always present wherever true membrane is found in the larynx.

Laryngeal diphtheria, without the presence of membrane in the pharynx or nose, sometimes occurs, the symptoms being quite similar to membranous laryngitis. The characteristic odor, however, is usually present, and the Klebs-Löffler bacilli may be found.

Hemorrhagic laryngitis may occur as a result of acute laryngitis, or from syphilis, tuberculous or malignant disease, or from rupture of a blood-vessel.

Simple chronic laryngitis (chronic catarrh of the larynx) is an inflammation involving both the superficial and deeper layers of the mucous membrane, with more or less of tissue-changes. The disease is supposed to result from repeated acute attacks. A subacute variety may be mentioned, but it cannot be clearly defined beyond stating that it is the commencement of the chronic form. Among other causes are the inhalation of irritating gases or dust, nasal obstruction, and improper use of the voice. The marked symptoms of this condition are hoarseness, a tickling sensation, with a tendency to clear the voice, slight cough, with considerable secretion, and occasjonal loss of voice.

Dry laryngitis (laryngitis sicca, atrophic laryngitis, laryngeal ozæna) is always associated with a similar condition in the nose and nasopharynx, the symptoms of which have all been described.

Anæmia of the larynx, when marked, is usually a local manifestation of general anæmia.

Singers' nodules (chorditis tuberosa, trachoma of the vocal cords) are new-growth formations appearing on the margin of the vocal cords and usually at the junction of the middle and anterior thirds. They are small oval masses, sometimes developing upon both cords. While resulting from inflammation, the exciting cause is no doubt the improper use of the vocal apparatus. There is marked interference with phonation and sometimes complete loss of voice. Treatment consists either of rest or the adoption of a system of vocal exercises which bring other series of muscles into activity. Local astringent applications have been employed.

Syphilis of the Larynx.— Both secondary and tertiary lesions of syphilis may appear in the larynx, mucus patches, however, being somewhat rare. The tertiary stage is of comparative frequency, and is manifested by the development of gummata, with destructive ulceration and subsequent cicatrization.

Tuberculosis of the Larynx.— This disease, also called consumption of the larynx, consumption of the throat, laryngeal phthisis, and tubercular laryngitis, is a specific inflammation of the larynx, the direct result of the tubercle bacillus. Tuberculosis of the larynx is rarely, if ever, a primary affection, and usually occurs as a manifestation of general tuberculosis. It begins with the development of minute miliary tubercles in the larynx, which eventually result in large swellings of the arytenoid cartilages. These subsequently break down, forming large ulcerations. Great suffering results, with dysphonia, dysphagia, continuous irritation of the larynx, progressive hoarseness, and irritating cough with excessive expectoration. In the late stages hemorrhage may occur. This form of tuberculosis is rapidly fatal, with but little hope of the patient's recovery.

Foreign Bodies in the Larynx.— Accidental entrance of foreign bodies into the larynx occasionally occurs. Foreign bodies usually enter during the process of swallowing, speaking, or breathing. The resulting danger depends much upon the character and size of the foreign body, and also upon its location. Liquid food and even small portions of solid food, are usually dislodged with little difficulty unless the entire calibre of the larynx is shut off. Foreign bodies may usually be seen by the ordinary methods resorted to for examining the interior of the larynx. They are removed by extraction by way of the mouth and larynx, or by external operation. Unfortunately the masses are sometimes drawn beyond the larynx into the bronchial tubes with fatal results.

Neuroses of the Larynx.— Of the various laryngeal symptoms sometimes resulting from impaired nerve-supply or from brain-lesions is spasmodic cough. This occurs more frequently in persons of neurotic type, although it may be of reflex origin. Anæsthesia, paræsthesia, and hyperæsthesia of the larynx may be mentioned under this type of affections.

Hysterical aphonia is usually described as a sudden and complete loss of voice, occurring in unmarried females. The immediate existing cause is usually shock, fright, anger, or some other sudden emotion. The condition may remain for some time, and recovery may be sudden and unexpected and without treatment.

Laryngeal Vertigo.— This is a neurosis in which the dominant symptoms are a sudden strangling cough with vertigo and momentary loss of consciousness. It is a rare affection, and is usually associated with acute or chronic inflammation of the larynx, strongly influenced by fatigue or nervous excitement. The disease quickly responds to treatment.

Paralysis of the Vocal Cords.—Temporary

interference with the nerve-supply of the various muscles controlling the larynx, especially from local causes, is not infrequent. The paralysis following diphtheria and accidental poisoning is typical. A more severe form results from pressure from aneurism, cancer, phthisis, and syphilis. But lesions of the brain are by far the most destructive in results. Paralysis in this location may be either motor or sensory. Bilateral paralysis of the superior laryngeal nerve is both motor and sensory in character. The gravity of these conditions depends upon the cause. Bilateral abductor paralysis, on account of the approximations of the vocal cords without the muscular power to separate them for proper inhalation, is dangerous to life, inasmuch as a fatal attack of dyspnœa may occur at any time.

Intubation of the Larynx.— This process was devised and perfected by the American physician, Joseph O'Dwyer. It consists in placing a hollow tube within the larynx for the purpose of relieving dyspnœa. Intralaryngeal tumors sometimes tend to occlude the lumen of the larynx, and intubation is resorted to for the relief of the attendant dyspnœa. Intubation also serves as a method of relief in cases of laryngeal stricture. The operation is never attempted unless the patient's life is threatened by occlusion of the larynx or sudden spasm. The most common disease giving rise to the necessity for intubation is diphtheritic laryngitis.

Tracheotomy.— An operation whereby an external opening is made into the trachea below the larynx, through which a tube known as the tracheotomy-tube is inserted. It is performed for the relief of any obstruction to breathing. The site selected for entrance into the trachea may be high or low according to the nature and location of the obstruction.

Operations on the Larynx.— Thyrotomy consists of splitting the thyroid cartilage in the median line for the purpose of opening the larynx and removing growths or foreign bodies. Laryngectomy is an operation for the complete removal of the larynx, and is performed only in case of malignant growth. In cases where only part of the larynx is removed it is called partial laryngectomy. An artificial larynx is an instrument which in certain cases may be introduced after a laryngectomy, and which serves to fulfil some of the functions of the larynx. Consult: Kyle, 'Diseases of Nose and Throat' (1900); Bosworth, 'Diseases of Nose and Throat' (1889); Knight, 'Diseases of Nose and Throat.'

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Nose'bleed, hemorrhage from the nose; epistaxis. This is the most frequent form of bleeding from a mucous membrane. It may be caused by direct injury, as by a blow upon the nose, a scratch within the nostril, etc., or may result from ulceration or other morbid growth in the nasal cavity. It is most common in children and young adults. When an active hemorrhage, it may be preceded by a feeling of tension and heat in the nostrils, pain in the forehead, giddiness, buzzing in the ears, flushing of the face. These symptoms are seldom all present in the same case, and in many instances the flow of blood is not preceded by any apparent disorder. Nosebleed may also be of a passive character, as when due to a morbid state of the blood, for example, in typhoid fever, scarlet fever, purpura, scurvy, etc., or to obstruction of the circulation by disease of the heart and liver. In persons advanced in life it must be more cautiously interfered with than in the young. If the person so affected is plethoric, the hemorrhage is evidently of an active character, and is a natural relief. usually it will stop by the clotting of the blood in the nostril, or upon pressure of the wing of the nostril against the nasal septum. It may, however, go to an extreme extent, and require other means for checking. There are many methods of affecting this, but the application of cold water, snow, ice, etc., to the forehead, spine, or other parts of the body is the most general. Raising both arms suddenly above the head has been said to stop the flow quickly; or a small quantity of solution of alum, as strong as it can be made, may be thrown up with a syringe, or a piece of linen soaked in the solution may be stuffed up the nostril. From 10 to 15 drops of dilute sulphuric acid may be given in water at intervals, according to the nature and persistence of the attack. The application of cotton or a sponge, tannin, alum, etc., may be necessary under direction of a physician, who, in desperate cases, is needed for discovering the bleeding-point, and by whom plugging of the nostril may be resorted to.

Nosology, in medicine, that science which treats of the systematic arrangement or classification and nomenclature of diseases. Many systems of nosology have been in use at different times, some of which have been founded on the nature of the ascertained cause of disease; others on the pathological conditions which attend diseases; and still others on the differences between structural and functional diseases, and so on. The system introduced by William Farr, the London medical statistician, has in recent years been accepted as the most advantageous for statistical purposes. It is expanded most fully in the nomenclature of diseases issued in 1884 by the Royal College of Physicians and Surgeons. Ten years later this work was revised, and it is used in the United States as well as in Great Britain.

In Farr's system of nosology diseases are divided into four primary classes, which are subdivided into various orders. The classification is as follows:

First Class.— This class includes zymotic diseases, diseases which are either epidemic, endemic, or contagious, induced by some specific body, or by the want of food or by its bad quality. In this class there are four orders: (1) Miasmatic diseases, such as smallpox, measles, scarlatina, diphtheria, croup, whooping-cough, scarlet, typhus, typhoid, and yellow fevers, cholera, ague, boils, erysipelas, dysentery, rheumatism, diarrhœa, etc.; (2) enthetic diseases, such as syphilis, gonorrhœa, hydrophobia, leprosy, glanders, etc.; (3) dietic diseases, such as famine, fever, scurvy, rickets, cretinism, delirium tremens, etc.; (4) parasitic diseases, as itch or scabies, worms, scald-head, etc.

Second Class.—In this class are included constitutional diseases, those affecting several organs, in which new morbid products are frequently deposited; sometimes hereditary. This class is divided into two orders: (1) Diathetic

diseases, such as gout, dropsy, cancer, canker, mortification, dry gangrene, etc; (2) tubercular diseases, as scrofula, phthisis, mesenteric tuberculosis, etc.

Third Class.— Local diseases are assigned to this class. These are the diseases in which the functions of particular organs or systems are disturbed or obliterated, with or without inflammation; sometimes hereditary. This class contains eight orders: (1) Diseases of the brain or, more strictly, of the nervous system, as apoplexy, paralysis, mania, epilepsy, hysteria, neuralgia, convulsions, etc; (2) diseases of the heart or circulatory system, as carditis, valvular disease of the heart, aneurism of the heart and aorta, fainting, varicose veins, etc.; (3) diseases of the lungs or respiratory system, as bronchitis, laryngitis, pleurisy, asthma, pneumonia, tuberculosis, phthisis, etc.; (4) diseases of the bowels or digestive system, as gastritis, enteritis, jaundice, constipation, dyspepsia, pancreatic disease, etc.; (5) kidney diseases, as stone, gravel, diabetes, Bright's disease, etc.; (6) genetic diseases, as varicocele, uterine tumors, ovarian tumors and dropsy, etc.; (7) bone and muscle diseases, as caries, spinal curvature, necrosis, exostosis, soft and brittle bones, muscular atrophy, etc.; (8) skin diseases, as roseola, eczema, whitlow, impetigo, acne, etc.

Fourth Class.—Under this class are embraced developmental diseases, special diseases resulting from the formative, reproductive, and nutritive processes. This class includes four orders: (1) Developmental diseases of children, as malformations, idiocy, congenital deaf-dumbness, teething, etc.; (2) developmental diseases of women, as chlorosis, childbirth, paramenia, climacteria, etc.; (3) developmental diseases of old people, as old age and its concomitant affections; (4) diseases of nutrition, as atrophy, debility, etc.

Various other classifications have shown some advantages for special purposes; in fact different systems will always be required for different uses. Recent progress in bacteriology has necessitated modifications in nosological methods, and future advancements will do the same, while the methods of modern medicine lead to such classifications as best suit the requirements of scientific knowledge applied in ordinary practice.

Nossairians, nŏs-sā'rĭ-anz (Arabic for Nazaræans), a subdivision of the Shiites, or followers of Ali, who hold that God has incorporated himself with some of their prophets, particularly with Ali, and Mohammed ben-Hanisiah, his son. The Nossairians are charged with borrowing this doctrine from the Christians who teach the incarnation of God in Christ, hence they nickname them Nazaræans. Consult Broughton, 'History of Religions.' See MOHAMMEDANISM.

Nossi-Bé, nŏs-sē-bā', a volcanic island off the northwest coast of Madagascar; about 14 miles long and eight miles wide. In 1840 it was ceded to France by Madagascar, and when Madagascar became a possession of France, in 1896, Nossi-Bé became a part of the territory under the governor-general of Madagascar. Portions of the island are very fertile. Hellville, the chief city, is a port of call visited annually by a large number of ships. Pop. (1901) 9,500. See MADAGASCAR.

Nostal'gia (Greek, "homesickness"), a feeling of depression and anxiety due to absence from home or country. The victim of this disease is possessed with the desire to return, and often filled with apprehension and despair when the desire is without early prospect of being gratified. The condition is apt to be attended by loss of sleep, loss of appetite, often by emaciation, and various forms of physical malady, while the psychic disturbance sometimes leads to melancholia ending in mania and death. Nostalgia is especially liable to occur in cases of unwilling absence from home, as those of conscripts, etc. Even soldiers voluntarily serving far from home are often great sufferers from this disease, insomuch that army medical officers have come to recognize it in its extreme severity as a disability warranting furlough, or even discharge, in order to save the patient's life. This aspect of nostalgia has recently been impressively illustrated in the United States army in the Philippines.

Nostradamus, nŏs-tra-dā'mŭs (true name MICHEL DE NOTREDAME), French physician and astrologer: b. Saint Remy, Provençe, 14 Dec. 1503; d. Salon 2 July 1566. He was of Jewish descent, studied first at Avignon, and then at the medical school of Montpellier, and after taking his degree acted for some time as a professor, but afterward settled as a medical practitioner at Agen. Finally, after traveling in Italy, he established himself at Salon, near Aix, about 1544, where he wrote his famous 'Prophéties' (Centuries) or astrological predictions written in rhymed quatrains. They obtained great success; Catherine de' Medici invited him to court to cast the horoscope of her sons; and on the accession of Charles IX. he was appointed royal physician. In 1550 he published an almanac containing weather predictions. Consult: Bareste, 'Nostradamus' (1842).

Nostrils. See NOSE AND THROAT; NOSEBLEED.

Nos'trum, a derogatory term for quack remedies and medicines, and for certain patented remedies which have proven worthless or injurious.

Nota, nō'tä, **Alberto,** Italian dramatic poet: b. Turin 15 Nov. 1755; d. there 18 April 1847. He was carefully educated and after studying law practised for a long time as an advocate, and held important appointments under government until the political circumstances of Italy obliged him to retire from public life. The comic element is weak in him, the plot usually very simple, and the events taken from ordinary life. On the other hand he excels particularly in his delineations of character, and most irregular natures are presented with extraordinary skill. Of his numerous dramas 'La Fiera' (1826), a graphic and amusing description of manners, is perhaps the best. Among others may be named 'Il Filosofo celibe' (1811); 'La novella sposa' (1826); 'Il Torquato Tasso' (1826). Twelve editions of his works appeared between 1816 and 1843, the last Italian edition 'Comedie di Alberto Nota' (8 vols.) appearing 1842–3.

No'tables, Assembly of, in French history, signifies the deputies of the states who were appointed and convoked by the king. In the early history of France mention is several times made of the notables; but the first assembly of any

importance was in 1558. From 1626 no such assembly was again called, till in 1786 the minister and comptroller-general Calonne conceived the idea of summoning the notables for the purpose of effecting several arrangements which he considered necessary; and there were accordingly assembled 7 princes of the blood, 9 dukes and peers, 8 field-marshals, 22 noblemen, 8 counsellors of state, 4 masters of requests, 11 archbishops, 37 chief justices, 12 deputies, the civil lieutenant, and 25 magistrates of the different cities of the kingdom, making in all 144 persons. This assembly forms an epoch in the modern history of France. A second meeting of the notables was called in November 1788 to consult on the manner of assembling the States-General. See FRANCE, *History*.

No'tary, or Notary Public (Latin, *notarius*, from *nota*, mark), originally denoted, with the Romans, those slaves or freedmen who acted as stenographers (making use of certain abbreviations, signs, *notæ*), particularly in the meetings of the senate. In later times the *notarii* were the secretaries of public authorities. From the Romans the name passed over to the nations of Western Europe; and in modern times a notary is a witness, appointed as such by government, whose testimony is in some cases useful, to give credibility to instruments; in other cases is required by law to give them full validity, as, for instance, in protests of bills of exchange, etc. In France the importance of the notary was, and still is, greater than anywhere else. He is not only a public witness for every one who wishes his testimony, but he is also the great witness of government. He makes all contracts, mortgages, and other deeds and conveyances where the property in question amounts to more than 150 francs.

In Great Britain and the United States a notary public is a person who publicly attests deeds, or writings, to make them authentic in another country; but he principally acts in business relating to commerce; makes protests of bills of exchange which are not accepted or not paid; attests the statements of masters of ships in regard to the damage which their vessels have suffered, etc. Notaries are usually commissioned by the executive of their States, and derive their particular powers from statute provisions. In Rhode Island they are elected annually by the general assembly. In New York the statute which defines their powers in respect to foreign and inland bills, drafts, and notes, confers upon them the further authority "to exercise such other powers and duties as by the law of nations and according to commercial usage, or by the law of any other state, government, or country, may be performed by public notaries." In New Hampshire, in addition to the usual powers of the office, notaries may take depositions, and acknowledgments of deeds before them have the same validity as those made before justices of the peace. Similar provisions are found in the statutes of Connecticut and Rhode Island. In New York State women are occasionally appointed notaries by the Governor.

Notation, Arithmetical, any mode of designating number by marks or figures. Modes of arithmetical notation are more ancient than modes of representing ideas and concepts by ideographs, hieroglyphs, or alphabetic characters. Doubtless the first step toward a system of numerical notation was that of designating unity by a single stroke or score, and additional units by additional scores or strokes. The Roman system of notation plainly had its origin in this primitive method, in which all numerical quantities were noted by strokes, one for each unit. But, so to speak, the instinctive mode of counting by means of the 10 fingers (*digiti*) would suggest the division of a long line of strokes into groups of 10, answering to the 10 fingers; and it is supposed that each group of 10 would be marked off by two intersecting diagonal lines forming a cross or X, thus, . The group once thus marked off, the X would become its representative abbreviation and would express 10. Similarly, half of 10, 5, would be represented by the upper half of X, which is V. And as it came to be a principle of Roman notation that a smaller number prefixed to a greater was to be subtracted from it, 4 would be represented by IV and 9 by IX: in some instances 8 and 18 would be represented by IIX and IIXX, respectively. Ten X groups were represented in Roman notation by , or (rounded) C, the initial letter of Lat. *centum*, hundred; and as V (five) was formed of X, being half of X, so by cutting off the upper limb of a symbol was found for 50 (L), half of *centum*. The subtractive mode of expression was usual in the notation of 40 (XL.), of 90 (XC), or 400 (CD), etc.; less usual was XXC for 80. Ten hundred was represented by M, the initial letter of *mille*, thousand, and this M was commonly written ; half of this symbol was used to designate half a thousand and was written either D or ; the sign for thousand, too, was currently written . These are all the signs used in Roman numeration — seven in all. Higher numbers, up to a million, were expressed as follows: 10,000. ; 100,000, ; 1,000,000, . The symbol for 10,000, , being cut in two, the latter half, , represented 5,000; in like manner represented 50,000, and 500,000. With this cumbrous method of notation all arithmetical operations involved great difficulty, and hence for any but the most trifling calculations the ancient Romans had to resort to the use of the abacus (q.v.).

That, like the Romans, the primitive Greeks employed a method of notation by strokes appears from rude inscriptions on archaic monuments and on vases; but, unlike the Romans, the Greeks at an early period abandoned that clumsy mode and resorted to the alphabet for number-symbols, adopting the method of notation which was in use among the Phœnicians and the Hebrews. Neither the Phœnician nor the Hebrew alphabet had the requisite number of letters (27), and the lack (five) was supplied by five arbitrary signs. The Greek alphabet had 24 letters, and to these were added three other characters, namely, ϛ for six, ϙ or ϟ for 90 and ϡ for 900. The Greek notation parallels the Hebrew, letter for letter from alpha (α), one, to omicron (ο), 70; Hebrew Phœnician and Greek agree in employing the first nine letters or symbols to designate units; the second nine to designate tens, and the third to designate hundreds. The Greek scheme is as follows:

1	2	3	4	5	6	7	8	9
α	β	γ	δ	ε	ϛ	ζ	η	θ or ϡ
10	20	30	40	50	60	70	80	90
ι	κ	λ	μ	ν	ξ	ο	π	ϙ or ϟ
100	200	300	400	500	600	700	800	900
ρ	σ	τ	υ	φ	χ	ψ	ω	ϡ

To express thousands, the letter iota (ι) or an accent mark (′) is subscribed to the numeral letters, for example, α_{ι} =1,000, β_{ι} =2,000, etc.; to express a number multiplied by 10,000 the capital letter M is subscribed (M standing for μυριοι, 10,000), for example, δ_{M} =40,000, ω_{M}= 8,000,000. Fractions are written with the numerator on the line and the denominator a little above, and a small space left between the integer and the fraction, thus: κα $\frac{\eta}{\iota\beta}$=21$\frac{8}{12}$,

Though the Greek notation is far superior to the Roman, it makes arithmetical operations exceedingly complex. For example, in multiplying 123 (ρκγ) by 321 (τκα) these operations are necessary:

ρ	multiplied by	τ	= 30,000	= γ_{M}
κ	"	τ	= 6,000	= ϡ
γ	"	τ	= 900	= ϡ
ρ	"	κ	= 2,000	= β_{ι}
κ	"	κ	= 400	= υ
γ	"	κ	= 60	= ξ
ρ	"	α	= 100	= ρ
κ	"	α	= 20	= κ
γ	"	α	= 3	= γ
			39,483	$\gamma_{M}\beta\rho\eta\gamma$

The Chinese system of notation was originally in principle the same as the Roman, but has been much simplified and variously improved, so that it is almost as expeditious a means of representing very large numbers as our own notation. But it is still almost or quite as cumbersome as the Roman system in the representation of numbers under 20. In it 1, 2, 3, 4 are represented by strokes, 5 by a special symbol and 6, 7, 8, 9 by that symbol followed by the requisite number of strokes: there is a symbol for 10, and from 10 to 20 the numbers are written after the same manner as those from 1 to 10. But while in the Roman system the series of tens is represented by XX, XXX, XXXX (or XL), etc., in the Chinese the successive decades are expressed by the symbol for 10 with the symbols for 2, 3, 4, etc., to the left of it as multipliers; and in like manner multipliers of hundreds, thousands, etc., are affixed.

The decimal system of notation by the nine «Arabic» numerals and the cipher appears to have been introduced into Europe through the Arabians in the 11th century; but the system had been employed centuries before in India. Though evidence exists of its use in Spain and in Italy in the 13th century by learned men, it was fully 300 years before it displaced the clumsy Roman system even in England. Though the digit-signs themselves, by their simplicity, are infinitely superior to the Roman symbols, and by their small number, ten, are far more efficient than the 27 Greek letter-numbers, the preeminent advantage of the decimal system over all other systems consists in the fact that in a line of figures, however long, the value of each, whether in units, tens, hundreds, thousands or millions, is determined by its place in the line. A figure standing alone represents never more than nine; a figure in the first place to the left of the last figure in a line represents always its own digit value multiplied by 10; in the third place, the same multiplied by 100, and so on; each remove to the left raises the value of the figure tenfold. The use of the cipher is to keep the figures in their due places in the line; thus in 190 the cipher keeps the nine in the place of the tens; in 2,043, the cipher keeps the 2 in the place of the thousands. Before the decimal system of notation had displaced the Roman system, writers often combined the two, putting, for example, X3 for 13, or L9 for 59; or, being ignorant of the function of the cipher and of the significance of the mere position of a figure in a line they would write 502 for 52, as they would write in Roman numerals LII, or in Greek letter-numbers νβ. In view of the adaptability of the Arabic notation and numeration to the expression of numbers, whether integral or fractional, it is singular that the common use of decimal fractions was first proposed as late as 1585, by Simon Stevin or Stevinus, native of France, but employed in the military service of Maurice, Prince of Orange. But had it been necessary to retain his awkward method of decimal notation, the decimal system could hardly have come into general use. He expresses thus the decimals in 237.578: 237 ⓪ 5 ① 7 ② 8 ③. Even Napier, to whom the credit is usually given of having first employed the decimal point, expresses the decimals of 1993.273 thus: 1993,2′7″3‴, though in another place he uses this form: 1993,273. Later, Napier substituted the point (.) for the comma as sign of a decimal fraction.

Duodecimal and Sexagesimal Notations are scales of notation in which 12 and 60 respectively are the base. In duodecimal notation the local value of the symbols increases twelve-fold as they proceed from right to left. But in calculations of shillings and pence British, and of feet and inches, though part of the work is done on the duodenary scale, the numbers themselves are expressed both in symbols and in words according to the denary scale and the decimal nomenclature. Twenty-four feet nine inches on a duodecimal scale would be 20.9, that is, two twelves without integer remainder, and nine twelfths; but we write it 24.9. The sexagesimal scale is used in the common subdivision of the hour into minutes and seconds; but as in the case of the foot and the inch, the shilling and the penny, we express the result of calculations according to the common denary scale: a complete workable sexagenary scale would require the invention of sixty different symbols.

Notch, The. See CRAWFORD NOTCH.

Note, (1) in law and business. (See PROMISSORY NOTE.) (2) In music, a character which, by its place on the staff, represents a sound, and by its form determines the relative time or continuance of such sound. See MUSIC.

Nothosaurus, a genus of small sauropterygian reptiles, allied to the plesiosaurs, and the type of a family which includes several genera confined to the Triassic period, and prevalent as fossils in the Old World, especially in the German Muschelkalk formation. Their necks were long and terminated in an elongated skull with crocodile-like jaws; the limbs were comparatively long and slender. Consult: Zittell-Eastman, 'Text-book of Palæontology,' Vol. II. (1902).

Notker, nŏt'kėr, two Swiss monks of the monastery of Saint Gall. SAINT NOTKER BALBULUS (the Stammerer): b. Thurgau about 840; d. St. Gall 6 April 912; is best known for his adoption of the simple Roman or Gregorian chants, and for his words for many sequences, the most famous being 'Media vita in morte sumus.' He was canonized 1513. NOTKER LABEO (Thick Lipped; sometimes called "Teutonicus," the German); b. about 950; d. 1022; founded a great school of translators, who, working under his name translated into German Boethius, the Psalter, etc., and thus left important documents for the study of Old High German in the 10th and the 11th centuries. The versions of Labeo and his school are edited by Piper (1883–4). Consult Kelle, 'Die Sankt Gallen deutschen Schriften und Notker Labeo' (1888).

Noto, Sicily, a city and episcopal see, three miles from the Mediterranean, and 27 miles by rail southwest of Syracuse. Its chief buildings are a fine cathedral and town hall. It has manufactures of olive oil, vegetable fibre, wine, and macaroni, and quarries of limestone. Noto dates from 1703 when it replaced the ancient Netum overthrown in 1693 by an earthquake. Pop. (1901) 18,500.

No'tochord, or **Chorda Dorsalis,** a rod of gelatinous tissue forming the main skeletal axis in the young of all Chordata (q.v.) and in some persisting as the only support of the body throughout life. It arises in development from the mid-dorsal line of the entoderm (see EMBRYOLOGY), becomes cut off from this parent layer and comes to lie as a continuous unsegmented structure between the digestive tract and the central nervous system. Around it is formed an envelope, the notochordal sheath, and in the vertebrates the bodies or centra of the vertebræ arise. In the lower vertebrates parts of the notochord persist throughout life (for example, filling the cavities in the ends of the vertebræ in fishes), but in the higher forms the notochord is almost entirely replaced by bone and the intervertebral ligaments, the sole remnants of this structure in man being the so-called *nucleus pulposus* of these ligaments. See AMPHIOXUS; ASCIDIAN.

Notonec'tidæ. See FRESH-WATER INSECTS.

Notor'nis, a genus of gigantic rail-like birds of the South Island of New Zealand without the power of flight. The genus was first known by fossil remains named *Notornis mantelli.* Subsequently living examples were found; but it is supposed that none now exist. Norfolk Island formerly had another species, pure white, but it was exterminated by early white visitors to the island. Consult Newton, 'Dictionary of Birds' (1896).

Notothe'rium, a genus of fossil marsupials found in Upper Pliocene deposits in Greenland and South Australia, allied to *Diprotodon* (q.v.) but smaller.

Notre Dame, nō'tr däm, **University of,** a Roman Catholic institution in charge of the Fathers of the Holy Cross, at Notre Dame, Ind. It was founded in 1842 and chartered two years later. It has 13 full collegiate courses besides courses in art and music. The courses lead to the degrees of A.B., B.S., Ph.B., and B.L. The equipments for all laboratory and applied science work are exceptionally good; the science building and furnishings are valued at $500,000. The departments of natural science received great assistance in their foundation work from the personal attention of the scientist, Very Rev. J. A. Zahm (q.v.). The frescoes, and a number of the oil paintings are by Gregori, and are of remarkable beauty and power. To encourage good works along spiritual and intellectual lines, the University presents each year a medal called the "Lætare Medal" to some Roman Catholic layman or woman who has done some special good work for the benefit of humanity. Two regular publications are issued from the University, but one, 'Ave Maria,' is not a distinctively university periodical. Affiliated with the university are several schools for the brothers, novices and young priests of the Congregation of the Holy Cross, and on the grounds is the Provincial House of the Order for the United States. The university has also several preparatory schools in different parts of the United States. In 1903 there were connected with the university 60 professors and instructors; 1,000 students, 200 of whom were in the preparatory department. The library contained 56,000 volumes, valued at $76,000; the scientific apparatus, machinery, and furniture was valued at $205,000; and the grounds and buildings at $2,010,000.

Notre Dame de Paris, dė pä-rē'. See PARIS.

Notre-Dame de Paris, a romance in prose by Victor Hugo, published in 1831. The scene is placed in Paris at the close of the reign of Louis XI. The cathedral seems to fill the author's vision and dominate his mind from beginning to end. Among his different conceptions of Notre-Dame he brings out most clearly of all the truth that the cathedral of the Middle Ages was the book of the people; and that since the dawn of printing, books have taken the place of those marvelously involved and inexhaustible carvings, where the smoldering passions of the multitude, their humor and irreligion as well as their religion and poetic emotion, found continual expression. To the reader who loses himself in the atmosphere thus created, the world is France, France is Paris, Paris is the cathedral. He is taken through the aisles and galleries, out on the roof, up in the towers, then faithfully, scrupulously through the squares or cross-roads of the old city, along crooked streets that have vanished, and thoroughfares still existing, like Rue Saint-Jacques or Rue Saint-Denis, which it calls the arteries of Paris. Thus it may be taken as a 15th century guide-book of the town, answering all the purposes of a Baedeker; not only giving the general topography, but touching on nearly every structure then standing. Like Walter Scott's 'Quentin Durward,' and Théodore de Banville's play 'Gringoire,' 'Notre-Dame' contains a searching study of the treacherous but able monarch, Louis XI.

Nott, nŏt, **Charles Cooper,** American jurist: b. Schenectady, N. Y., 16 Sept. 1827. He is a grandson of Dr. Eliphalet Nott (q.v.) and of Dr. Charles D. Cooper. He was graduated from Union College in 1848, studied law at Albany, N. Y., and began the practice of his profession in New York in 1851. Through his means, in February 1860, Abraham Lincoln came to New York to deliver the "Cooper Institute Address," which resulted in Lincoln's nomination for the Presi-

dency. During the Civil War he served as captain in the 5th Iowa cavalry, and colonel of the 176th New York volunteers. Taken captive at Brashear, La., in June 1863, he was held prisoner in Texas until July 1864. In February 1865 he was appointed judge of the court of claims, and in November 1896 was appointed chief justice of the court by President Cleveland. He has published: 'Mechanics' Lien Laws' (1856); 'Sketches of the War' (1863; in German 1883); 'Sketches of Prison Camps' (1865; in German 1884); and has edited and compiled 'The Seven Great Hymns of the Mediæval Church' (1866, 8th ed. 1902), and the 'Court of Claims Reports' (38 vols. 1867–1903).

Nott, Eliphalet, American clergyman and educator: b. Ashford, Conn., 25 June 1773; d. Schenectady, N. Y., 29 Jan. 1866. He was graduated from Brown University in 1795 and entered the Presbyterian ministry the same year. After holding pastorates in Cherry Valley and Albany, N. Y., he became president of Union College in 1804, where he remained till his death. He published: 'Counsels to Young Men' (1810); 'Lectures on Temperance' (1847). His funeral sermon on the death of Alexander Hamilton was widely famous. By his inventions of stoves and other warming apparatus he acquired a fortune, much of which he devoted to the assistance of Union College.

Nott, Josiah Clarke, American ethnologist and physician: b. Columbia, S. C., 24 March 1804; d. Mobile, Ala., 31 March 1873. In 1824 he was graduated at the South Carolina College and from the medical school of the University of Pennsylvania in 1827. After further study abroad he established himself in Mobile, and in 1858 founded a medical school there. During the Civil War he was for a time on the staff of the Confederate General Bragg. With G. R. Glidden (q.v.) he wrote 'Types of Mankind' (1850), and 'Indigenous Races of the Earth' (1857), the purpose of which was to oppose the theory of the unity of mankind. He was sole author of 'The Connection Between the Biblical and Physical History of Man' (1849); 'The Physical History of the Jewish Race' (1850).

Nottebohm, nōt'tĕ-bōm, **Gustav,** German composer: b. Lüdenscheid, Westphalia, Prussia, 12 Nov. 1817; d. Grätz, Germany, 1 Nov. 1882. He served in the German army at Berlin in 1838–9, but continued his musical studies, and there formed a friendship with Schumann and Mendelssohn, through the influence of the latter obtaining his discharge from the army and becoming a composer of note. Among his works are: 'Ein Skizzenbuch von Beethoven' (1865); 'Mozartiana' (1880); etc.

Nottingham, nŏt'ĭng-ạm, **Heneage Finch,** 1ST EARL OF, English statesman: b. Kent, England, 23 Dec. 1621; d. London 18 Dec. 1682. He was educated at Oxford, studied law and was admitted to the bar of the Inner Temple in 1645. At the Restoration his reputation as a lawyer raised him to the post of solicitor-general; in 1661 he was elected member to Parliament for the University of Oxford, and was made a baronet, in 1670 became attorney-general, and in 1673 lord-keeper. He was made high chancellor in December 1674. In the same year he was made Baron Finch, and in 1681 became earl of Nottingham. His powers as an orator were highly rated; and Dryden has given to posterity his portrait in 'Absalom and Achitophel,' under the character of Amri. Several of his speeches on the trials of the judges of Charles I. have been published, as have also some of his parliamentary orations.

Nottingham, England, a city and civic county, capital of Nottinghamshire; on the Leen, near its junction with the Trent, 110 miles northwest of London. It occupies a picturesque site overlooking the Vale of Trent. The castle, which crowns the summit of a rock, rising 133 feet above the level of the Leen, was originally built by William the Conqueror as a means of overawing the outlaws frequenting the recesses of Sherwood Forest. Dismantled during the Protectorate, it subsequently became the property of the Duke of Newcastle, who in 1674 erected a large mansion on part of the site. This, after being partly burned in riots connected with the reform movement in 1831, now contains the Midland Counties Art Museum, free library, etc. The principal educational and literary institutions are the University College and Technical School, high school for boys, the Blue-Coat School, the School of Art, the People's Hall, and the Mechanics' Institute. An arboretum covering 18 acres is a feature of the town. The staple manufactures are cycles, hosiery, and lace, the latter being a specialty. There are also manufactures of cotton, woolen and silk goods, and of articles in malleable and cast iron. Nottingham was a place of importance in Anglo-Saxon times, and was twice or thrice taken by the Danes. Charles I. raised his standard here in 1642, and next year the town and castle were taken by the Parliamentarians. Serious riots, occasioned by the introduction of machinery, took place in 1811–12 and 1816–17. Pop. (1901) 239,753.

Nottoway (nŏt'ō-wā) **Indians,** an American tribe of the Algonquin family, formerly residing along the Nottoway River, in Virginia. They were very similar to the Tuscaroras of North Carolina. In 1785 about 400 survivors of the tribe occupied a reservation of 27,000 acres.

No'tus, the south wind or southwest wind.

Noue, François de la, frăn-swä dė lä noo, French Huguenot captain: b. near Nantes 1531; d. Montcontour 4 Aug. 1591. He was a member of an old Breton family, fought in Piedmont under Brissac, became a Protestant in 1557, and was one of Coligny's bravest lieutenants. In 1570, at the siege of Fontenay-le-Comte, he was wounded in the left arm, and after its amputation wore an iron mechanism to hold the bridle, thus winning the nickname of "Bras de Fer," or "Iron Arm." He fought in Flanders with great success from 1578 to 1580, when he was captured by the Spanish. His five years of captivity were occupied with the composition of his 26 'Discours politiques et militaires' (1587). He fought under Henry of Navarre at Senlis, Arques, Ivry, and Lamballe, and was mortally wounded in the last fight. Consult the biography by Hauser (1892).

Nourmahal, noor-ma-häl', "LIGHT OF THE HAREM," the heroine of Thomas Moore's poem, The Light of the Harem, in 'Lalla Rookh.' Her quarrel and reconciliation with the caliph

Harun al-Rashid form the theme of the story; afterward she is known as Nourjehan — "Light of the World."

Nouvelle France, noo-vĕl fräṅs, or **New France,** the original name given to Canada (q.v.) by the early French settlers.

Nova Cæs'area, the Latin name for New Jersey.

Nova Constella'tio Coinage, two silver coins proposed by Robert Morris in 1783 for national coinage, but not accepted by the Continental Congress. They were called the Mark and the Quint. See NUMISMATICS.

Nova Scotia, nō'va skō'shī-a, one of the three maritime provinces of the Dominion of Canada, comprises a long, narrow peninsula, on the eastern coast of North America, lying northeast and southwest, and the island of Cape Breton, separated from the peninsula on the northeast by the gut of Canso, 16 miles long and from ½ mile to 2 miles wide, and Chedabucto Bay. The dangerous Sable Island, surrounded by a sand bank on which many ships have been wrecked, is a dependency of Nova Scotia, from which it is distant about 90 miles in lat 43° 59′ N. at its eastern end, lon. 59° 45′ W. The whole province, including Cape Breton, lies between lat. 43° 25′ and 47° N. and lon. 59° 40′ and 66° 10′ W. The greatest length of the peninsula is about 280 miles and its greatest width from 50 to 100 miles. It is bounded north by the Straits of Northumberland and the Gulf of Saint Lawrence, south and southeast by the Atlantic Ocean, and northwest by the Bay of Fundy. The island of Cape Breton, whose extreme length is 100 miles, extreme width 85 miles, is almost equally divided by an inland sea, the Bras D'Or Lake. The peninsula has an area of 12,360 square miles, and Cape Breton 3,120 square miles. Sable Island is 25 miles long and 1¼ wide, and consists of sand hills thrown up by the sea, on which grasses grow which maintain many wild horses known as Sable Island ponies.

Topography.— The surface of Nova Scotia proper is undulating, and the scenery varied but not grand. Three ranges of highlands, with a general direction of from southwest to northeast, their general features clearly showing them to belong to the Appalachian Range, diversify the surface. These, roughly, are the range extending along the Atlantic coast from Cape Sable to Cape Canso, which are chiefly of Lower Cambrian formation, except for a belt of intrusive granite that stretches from Cape Sable to Chebucto Head, near Halifax; the Cobequid Mountains, which rise to a height of about 1,050 feet and extend from the Bay of Fundy on the north or isthmian side of the province, through the counties of Colchester and Cumberland to the vicinity of Pictou; and a detached, narrow ridge of trap, known as the North Mountain, about 700 feet high, which extends along the Bay of Fundy, from Digby County to the steep headland of Blomidon, in Kings County, near the entrance of Cobequid Bay. The rock formation of Cape Breton is similar to that of Nova Scotia proper, but is more irregularly distributed. The chief features of the surface of Nova Scotia were left marked as at present by the great earth storm of the later Devonian period. The fertile valleys between the three ranges of hills are respectively of Upper Silurian, Devonian, and Carboniferous origin. The northwest side of the peninsula is deeply indented by large arms of the sea, separated by steep promontories. The Atlantic side is penetrated everywhere by inlets of greater or less size, the most important of which are Chedabucto Bay, Halifax Harbor, and Chester Basin. The north shore, on the Gulf of Saint Lawrence, is comparatively smooth and uniform in its coast line, and this is true also of the eastern coast of Cape Breton, while the other sides of this island are very irregular. The peninsula has about 400 lakes, of which Rossignol in Queen's County is the largest. The Bras D'Or Lake in Cape Breton covers an area of 500 square miles, or about one sixth of the entire area of the island. The climate of Nova Scotia, tempered as it is by the Gulf Stream, which flows very near its southwesterly end, is comparatively mild, and especially in the sheltered Cornwallis and Annapolis valleys is favorable to comfort and health. The average temperature is 65° F. in summer, 25° F. in winter. The average rainfall for 27 years (1874–1900) was 38.1, average snowfall for the same period 75.4, total precipitation 45.6. On account of its freedom from extreme heat Nova Scotia has lately become a popular summer resort for United States people of the eastern and middle States. The province contains many rivers, but few of them are over 50 miles in length. In the valleys the soil is of great richness, and Nova Scotia is noted for its vast tracts of inexhaustibly fertile dyked marsh land, in earlier or later times by patient industry reclaimed from the sea. This marsh land lines the head waters of the Bay of Fundy and spreads far inland up the valleys of its river tributaries. In general, alluvial deposits are formed in river basins by materials washed down from higher levels by fresh-water floods; here the whole deposit is of tidal origin, the result of a landward rather than a seaward transportation. Every incoming tide is freighted with a finely comminuted sediment, the product of the wearing action of the currents upon the sides and bottom of the bay. The elements of this sediment are trap and new red sandstone, the latter being the greater element. Its detritus consists of a large percentage of silica, a little clay, the iron which mainly determines the reddish color of the deposit, and the calcareous matter which served as cement in the parent rock. The great fertility of this alluvium may ben seen in the fact that the Annapolis, Cornwallis, Grand Pré, and Cumberland marshes have been producing annually for over two centuries from two to four tons per acre of the finest hay. After the hay has been removed the dikes are converted into autumn pastures for cattle, who fatten more rapidly on their luxuriant after-growth than on any other kind of food. The reclaiming of these dikes from the daily tides, which if permitted to rush in will destroy the grass for a year, was begun by the Acadian French and energetically pursued by their successors, the New England people who came in 1760–1. The flora of Nova Scotia is much the same as in other sections of Canada south of the Saint Lawrence. The woods are maple, elm, walnut, oak, tama-

rack, spruce, pine, and other woods, hard and soft.

Agriculture.— The most important industries of the province are agriculture and fruit growing, fishing, mining, and lumbering. Of late, however, a good deal of activity has been shown in manufacturing of various kinds. Nova Scotia has an area above tide level of 13,483,671 acres, of which 5,080,901 are occupied. Of this, 34,240 acres are covered by orchards of apples, pears, plums, and cherries; 554,371 acres are hay land, 16,334 are in wheat, 37,459 in potatoes, and 91,087 in oats. In the last 20 years the fruit industry has greatly increased, cold storage making possible large shipments, especially of apples, to the British market. The total yield of apples in 1891 was 1,051,592 bushels; of plums, 9,246 bushels; of peaches, 534 bushels. In 1901 the yield was, apples 2,065,104 bushels; plums, 28,931 bushels; peaches, 3,231 bushels. The total value for 1902–3 of agricultural products, including fruit was $853,106, of apples alone $188,910, of animals and dairy products $711,207, of woods exported $1,048,160.

Fisheries.— The fisheries have always been active, salmon, cod, shad, mackerel, lobsters, and other fish abounding off the shores and in the rivers. The value of the total catch in 1901 was $2,112,022, an increase of $390,288, or nearly 23 per cent, over the value of 1899. The number of men employed in fishing vessels and boats in 1900 was 25,212, of persons employed in lobster canning factories, 6,447. The value of all fisheries for the fiscal year ending June 1903 was $8,000,000, and the number of men employed 29,529. Fishing receives from the Dominion government a subsidy outside of bounties of about $400,000 a year. In many parts of the province game is plentiful, bears, foxes, deer, and smaller animals being found in considerable numbers.

Minerals.— Nova Scotia is remarkably rich in minerals, the coal fields being almost inexhaustible, and gold, lead, copper, manganese, gypsum, and barytes being found in abundance. For the year ending 30 Sept. 1901 the sales of coal aggregated $3,119,335, the Province of Quebec being the largest consumer. The province has 11 coal mines, 5 of which are in the peninsula and 6 in Cape Breton island. In 1902–3 these mines employed 8,062 persons. There are more than 20 districts where gold is mined, the most important mine being at Sherbrooke in Halifax County. Between 1900 and 1901 the number of tons of ore crushed was 1,358,864, and the value of the gold extracted about $14,274,054. The value of the gypsum yield in the same year was $119,278. The mine royalties in 1902–3 reached the large figure of $487,948.90.

Manufactures.— In 1902–3 the value of manufactured products exported from Halifax reached the sum of $766,164. Among the chief manufactures are agricultural implements, biscuits and breads, coke, drugs, and chemicals, extract of hemlock bark, fertilizers, furniture, iron and steel, leather, and wood pulp. The canning of fruits, milk, and meat is receiving much attention. In Cape Breton and the western part of the peninsula considerable leases of crown lands have lately been made for the development of the wood pulp industry. In various places, owing to the abundance of hemlock bark, tanning is actively carried on, and some attention has long been given to sugar refining and rope and twine making.

Finances.— The revenues of the province come chiefly from a Dominion subsidy of about $433,000 annually; from mine royalties, which exceed this sum; from the lease of crown lands, which in 1901–2 amounted to $74,735; and from succession duties and other miscellaneous sources. The total revenue from all these sources in 1902–3 was $1,140,216. The expenditures were less than the revenue by about $53,000. At the close of the fiscal year ending 30 Sept. 1902 the debt of the province was $3,766,300. Nova Scotia supports a school for the deaf and dumb and one for the blind, an insane and a general hospital, and 24 poor-houses. Criminals are sent to the provincial penitentiary at Dorchester, N. B. The public charities in 1902–3 cost the province $40,573.

Transportation.— In 1901 the province had in operation 943 miles of railway; since then this has been increased to 1,055. There are now under construction 182 miles more. Telegraph and telephone lines run everywhere and the province has two cable stations, one at Canso and one at Sydney. At the close of 1901 Nova Scotia had in registration 1,980 vessels with a tonnage of 214,560. In that year she had registered 133 vessels with a tonnage of 14,660. The total number of ships arriving from foreign ports during the fiscal year ending 30 June 1901 was 3,103; tonnage 419,031. This registration includes the ships arriving at 85 ports. Of these Halifax heads the list, with 1,185 vessels and 899,079 tons, Sydney coming next with 361 vessels and 541,455 tons. Halifax is the third port in Canada, Victoria, B. C., being first and Montreal second.

Banks.— The banks in operation with their branches are: The Union of Halifax, Royal of Canada, Bank of Nova Scotia, Bank of British North America, and Commercial of Windsor. The clearing house transactions in 1900 amounted to $77,000,000.

Population.— The population is greater than that of any province of the Dominion except Ontario and Quebec. Ontario has over 2,000,000 inhabitants, Quebec over 1,500,000, and Nova Scotia, 459,574. Of this number 162,141 are reckoned as of English descent, 142,207 as Scotch, 55,830 as Irish, 45,067 as French, and 38,854 as German. The increase in population between 1891 and 1901 was 8,800. Halifax, the capital, has a population of 40,787; in 1891 it was 38,495. The next town in size is Sydney, the seat of the recently established steel industry in Cape Breton. In 1901 this town had a population of 9,908. In 1891 it had only 2,427. The number of incorporated towns in all is 28; of these the largest are Glace Bay, Yarmouth, Truro, Springhill, Amherst, New Glasgow, Windsor, and Pictou.

Government.— Since confederation the province has been represented at Ottawa by 10 senators, and 20 members of the lower house. It has its own local legislature, meeting at Halifax, and a lieutenant-governor appointed by the governor-general and his council. The local legislature consists of a council of 21 members and a legislative assembly of 38. The executive consists of three ministers with salaries and six without portfolios. The house of assembly is elected by the counties, the municipal units of government being counties and

towns. In each of the 18 counties the people elect a county council, which in turn appoints the other county officers. It is necessary to secure the sanction of the people in order to borrow money, and the lieutenant-governor has a right of veto upon the money-borrowing powers as well as the by-laws passed by the council.

Education.— Nova Scotia has an admirable free school system, which was introduced in 1865, but there are no separate schools as in Ontario and Quebec, under denominational control, receiving government support. In each of the 18 counties of the province there is a county academy, the highest grade of the public schools, the curriculum of which contemplates the fitting of pupils for college. In Truro there is a normal school, in which 1,044 teachers serving in 1901–2 were trained for their work. The whole number of teachers in that year was 2,492, and the number of pupils enrolled was 99,059. The schools are supported by local taxation and by subsidy, about two fifths of the necessary cost being met by government grant and municipal aid. The total expenditure per pupil in 1900–1 was $15.75. Education is controlled by a Council of Public Instruction, of which the Superintendent of Education is the head. The council is composed of the members of the Executive Council. The province has besides the schools already mentioned a school of agriculture, a school of mechanical and domestic science, several manual training schools, a school of art and design, a summer school of science, and five chartered colleges, and one divinity college having the power to confer degrees. The colleges are Kings at Windsor, Dalhousie at Halifax, Acadia at Wolfville, Saint Francis Xavier at Antigonish, and St. Anne's at College Point in Digby County. The divinity college is controlled by the Presbyterians and is at Halifax. The only college that is undenominational is Dalhousie at Halifax. In all these colleges together there are not more than 700 students. In Halifax, Windsor, Wolfville, Horton, and Annapolis there are private schools for boys and girls.

Religion.— The chief religious denominations are the Roman Catholic Church with 129,578 adherents, Presbyterian, 106,319, Baptist, 74,978, Anglican, 66,067, Methodist, 57,490, Free Will Baptist, 8,355, Lutheran, 6,572, Congregational, 2,938. No part of the population is without church attachment.

Distinguished Citizens.— Nova Scotia has reared many distinguished men, chiefly officers of the army and navy. Such are General William Cochran, Sir John E. W. Inglis, hero of Lucknow, Admiral Sir Provo W. P. Wallis, and Sir Fenwick Williams, hero of Kars. The humorist, Judge T. C. Haliburton ("Sam Slick"), was a Nova Scotian, as are also his son, Lord Arthur Haliburton, and Sir Charles Tupper, Bart., the well known statesman. Among the writers of the province have been Thos. B. Akins, Sir John G. Bourinot, John B. Calkin, Arthur W. Eaton, George M. Grant, Sir J. W. Dawson, George W. Hill, Joseph Howe, Mrs. M. J. Lawson, Arthur Lockhart, Beamish Murdoch, J. Macdonald Oxley, Benjamin Rand, Silas T. Rand, Theodore H. Rand, E. M. Saunders, Marshall Saunders, and T. Watson Smith.

History.—The Nova Scotian peninsula was the most important part of the ancient Acadia, and its little town Annapolis Royal, in French times called Port Royal, while the province remained in the hands of France was the chief Acadian seat of authority and centre of influence. The name Acadia or Acadie is first found in the petition of De Monts to the French king for leave to colonize this portion of the new world. The province of New Brunswick was included in Acadia, but not the island of Cape Breton. Nova Scotia's authentic history begins with the landing at Port Royal in the spring of 1604 of Sieur de Monts, a gentleman of the bedchamber of Henry IV. of France, who had previously accompanied Chauvin and Pontgravé to the Saint Lawrence. There is a French tradition that a little settlement was made in Cape Breton as early as 1541, but Port Royal was the first settlement ever attempted on any part of the peninsula. De Monts held a commission as lieutenant-general of Acadia with full powers to cultivate and hold the land, to discover mines, and to convert the Indians. In his first expedition another nobleman, Baron Poutrincourt, accompanied him. Owing to the failure of the French trading company in 1607, the colony they founded at Port Royal was suspended for nearly three years. In 1610, however, Poutrincourt again came to Port Royal and from that time the town has had a continuous history. When Poutrincourt came the second time he took possession of the houses his people had built in 1604, and it may therefore be said that Port Royal is the oldest town in all North America, except Saint Augustine in Florida, which was founded by Spaniards in 1565. Jamestown, Va., was founded by the English in 1607, and Quebec by Champlain in 1708. Shortly after 1610 other explorers came to Port Royal, in their wake coming first Jesuit, then Recollect priests, who soon converted all the native Micmacs (an Algonquin tribe) to the Roman Catholic faith. In 1613 Argal (afterward deputy governor of Virginia) destroyed the fort at Port Royal. In 1621 Acadia was granted to Sir William Alexander, who named it Nova Scotia and helped James I. establish the order of Baronets of Nova Scotia. In 1628 Sir David Kirk captured Port Royal for England, but in 1632 the province was restored to France. In 1654 Acadia was surrendered to English troops sent out by Cromwell, but in 1667, by the treaty of Breda was restored to France. In 1710 Col. Francis Nicholson finally conquered Port Royal for England, and in 1713 the treaty of Utrecht confirmed Nicholson's conquest. In 1749 Col. Edward Cornwallis brought out an English colony and founded the town of Halifax, immediately afterward establishing a civil government there in place of the military government at Annapolis. In 1755 because of their persistent refusal to take the oath of allegiance, the Acadian French were removed, and in 1760–1 their lands were occupied by 6,000 or 7,000 New England planters, who founded many of the best known families of the province. In 1758 a constitution, with an elective assembly, was granted Nova Scotia, in 1763 Cape Breton and Prince Edward Island were annexed to Nova Scotia, but in 1770 Prince Edward Island was separated. In 1773 began the large Scottish emigration which has given certain counties of Nova Scotia the chief part of their population. In 1776 and 1783 from 30,000 to 35,000 Loyalists, chiefly from New England and New York, poured into the province,

the New York Loyalists founding the town of Shelburne and creating in Nova Scotia the first colonial see of the English Church. In 1754 New Brunswick and Cape Breton were both separated from Nova Scotia, but in 1820 the latter was re-annexed. In 1848 responsible government was introduced and in 1867 Nova Scotia became a province of the Dominion of Canada. In its history as an English province Nova Scotia has had to the present 32 governors (since Confederation they have been, of course, lieutenant-governors), many of them more or less famous military men. Before the appointment of Lord Dorchester as governor-general of Quebec, Nova Scotia, and New Brunswick in 1786, she had also 11 lieutenant-governors, of whom Gen. Edmund Fanning, a Loyalist, was the last.

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ARTHUR WENTWORTH EATON,
Author of 'The Church of England in Nova Scotia.'

Nova Zembla, nō'vạ zĕm'blạ (Russian, *Novaia Zemlia*), two islands in the Arctic Ocean, belonging to Russia, and forming a dependency of the government of Archangel; lat. 70° 30′ to 77° N.; lon. 52° to 69° E. They are separated by the narrow Matotchkin Shar Strait, and from the Isle of Vaigatz on the south and from the mainland on the east by the Sea of Kara. Their greatest length, northeast to southwest, is about 740 miles; breadth, about 80 miles. The greater part of the interior is unexplored. The general slope of both islands appears to be toward Matotchkin Strait, on which the mouths of at least 15 small streams have been counted. Lakes also are numerous. The whole territory is wild and desolate. The coasts swarm with seals, various kinds of fish, and vast flights of water-fowl. The interior, which is partly covered with stunted shrubs, short grass, and moss, is frequented by reindeer, white bears, ermines, and Arctic foxes. In 1596 Nova Zembla was reached by Barentz, who wintered there. It was circumnavigated by Johannesen in 1869 and 1870, and the Kara Sea found comparatively free of ice. It was again circumnavigated by Captain Carlsen in 1871, and partially explored by Lieutenants Weyprecht and Payer in the same year, and again in 1872–4. Other explorations have been made since, and two or three settlements of Samoyedes have been established. Pop. (1897) 90.

Novalis, nō-vä'lĭs. See HARDENBERG, FRIEDRICH VON.

Novara Italy, (1) a town, capital of the province of Novara, situated between the Agogna and Terdoppia, 51 miles northeast of Turin. It has an ancient and magnificent cathedral with a lofty tower, an episcopal palace, two colleges, a ruinous old castle, and a remarkably fine market-house. The manufactures include sweet biscuits, which have a large sale. The rice and grain markets are the most important in Piedmont. Pop. (1901) 44,928. Novara is famous for the battle fought there on 23 March 1849, between the Sardinians and Austrians, in which the former were completely defeated, and Charles Albert, in consequence, abdicated in favor of his son Victor Emmanuel. (2) The province consists generally of a large and fertile plain, watered by the Po and several of its tributaries, and well adapted for the growth of rice. Pop. (1901) 745,347.

Novati, Francesco, frän-chĕs'kō nō-vä'tē, Italian philologist: b. Cremona, Italy, 1859. He was a professor of the Academy of Milan in 1883, and has since held professorships at Palermo and Genoa, returning to Milan in 1892. His frequent contributions to the scientific magazines have greatly furthered knowledge of philology, his chief attention being given to the study of the Renaissance. He has published 'Studj critici e letterare' (1889).

Novatianism, nō-vā'shĭ-ạn-ĭzm, the doctrine of Novatianus, a priest of the Church at Rome in the 3d century. Novatian had been a Stoic philosopher and carried out the stern, harsh views of that sect in his ministry as a Christian teacher. The schism called after him originated as follows: After the Decian persecution, a controversy arose about the manner of dealing with those who apostatized before the threat of torture or death (*lapsi*). Novatian at first inclined to advocate their absolution after due penance, but when Cornelius, the Roman bishop, followed this course, Novatian opposed his authority, and was chosen and ordained bishop by three country bishops in opposition to Cornelius, and thus became the first anti-pope. He was condemned in councils at Rome and Carthage. The party who shared his views were called Novatians. They held that, in the case of idolatry through fear of persecution, the Church could not absolve the penitent; and this doctrine they extended, at a later period, to all grievous sins. They claimed for themselves a character of especial purity, and assumed the name Puritans (*Cathari*). Their views continued to be taught in Italy and Africa up to the 6th century. See CYPRIAN.

Novel (Italian, *novella,* from Latin *novus,* new), a prose narrative of a series of fictitious events connected by a plot, and involving portraitures of character and commonly descriptions of scenery. The word novel seems to express a species of fictitious narrative somewhat different from a romance; yet it would be difficult to assign the exact distinction, and in French, Italian and German the same name (*roman, romanzo,* and *roman*) is used for both species of composition. In English the term novel is generally applied to narratives of everyday life and manners; romance to a series of adventures of a marvelous kind, and occurring in distant lands and past ages; while the name tale denotes generally a shorter production, which may include probable or improbable events, and is equivalent to the Italian *novella* and *conto,* the German *novelle* and *märchen,* and the French *conte.* All these kinds of prose narrative are here included.

Oriental.— Romances have existed from the remotest antiquity among the principal Oriental nations. In the most ancient literature of the Chinese are to be found parables, marvelous fictitious tales, and epics; and for many centuries they have had novels of social life similar to those of Europe. They only, among the Asiatic nations, have delineated the phenomena of common life, recounting the conversations, cares, and habits of the household without introducing incidents of a marvelous nature. The romance of the Hindus is perhaps of equal antiquity, but consists mainly of fantastic and improbable narratives, etc. The character of Hindu fiction has led some writers to believe that the Persian and Arabian tales were derived from India, as many of the fables no doubt were. The Arabian tales of the 'Thousand and One Nights' are examples of romantic narrative, highly esteemed in Europe, the recital of which is still more fascinating and general among the people of the East than is the perusal of printed novels among the Western public.

Greek.— The earliest Greek compositions are the 'Milesian Tales,' attributed to one Aristides. None of these tales are extant, either in the original or in the Latin version, made about the time of Marius and Sulla; but there remain about 40 stories by Parthenius Nicæas, which are supposed to be, to a certain extent, adaptations from them. The 'Cyropædia' of Xenophon resembles in many respects a historical romance. Clearchus, a disciple of Aristotle, wrote a series of love tales, which have been also lost. Shortly after him came Antonius Diogenes with a romance in 24 books, entitled 'Of the Incredible Things beyond Thule,' founded on the loves and adventures of Dinias and Dercyllis. Photius gives an outline of its contents in his 'Bibliotheca Codicum.' An interval of several centuries now elapses before we come upon another Greek writer of fiction. Lucius of Patra, and Lucian, who flourished under Marcus Aurelius, are the first important names we meet with. The works of the former are simply accounts of magical transformations, not properly developed tales, and Lucian merely makes use of his plots, as Bayes in the 'Rehearsal' did, to bring in fine things, humorous, satirical, and moral. We now come upon the most notable name in Greek prose fiction, that of Heliodorus, bishop of Tricca in Thessaly, who lived about the end of the 4th century. His 'Æthiopica,' or, as it is often called, 'The Loves of Theagenes and Charicleia,' though deficient in those characteristics of modern fiction which appeal to the universal sympathies of our nature, is extremely interesting on account of the rapid succession of strange and not altogether improbable adventures, and many and various characters introduced, and the beautiful scenes described. There can be little doubt but that his style and manner were closely imitated by Achilles Tatius and all the subsequent writers of erotic romance, and there is almost equal certainty that he formed a model to the ponderous historical romance writers of the school of Mademoiselle Scudéri. Next to Heliodorus in point of merit stands Achilles Tatius (flourished about 450–500 A.D.), whose romance in eight books, 'The Loves of Leucippe and Clitophon,' is a mine of marvelous incidents, which has been thoroughly ransacked by various French and Italian authors. Most of these classical romances relate the adventures of lovers carried off by pirates or otherwise separated, witnessing rites of magic and religion, secret orgies, and infamous revelries in the cities of the Mediterranean shores, and at last reunited by extraordinary coincidences. Unlike the modern novel, they were neither so numerous nor so highly reputed as to form an important part of the literature.

Mediæval.— The first mediæval romances of western Europe were metrical. Whether their materials and spirit were derived from Scandinavian and Teutonic sources, especially through the Normans, or from the East through the Spanish Moors and Crusaders, or whether they were products of the ancient Celtic genius, are questions not yet definitely settled. The wandering minstrels invented, translated, and amplified stories in order to satisfy the craving for the marvelous prevalent in the hut and in the castle, rehearsing known facts and genealogies, transforming chronicles and legends into romances of chivalry, in which Alexander the Great figures as a knight-errant, and Virgil as a mighty magician; adapting Byzantine tales, and devising humorous and scandalous stories of real life. The romances of chivalry introduced knights whose deeds, courage, and sentiments of honor and delicacy were praised in the most extravagant manner. The transformation of metrical into prose romance was partly owing to the invention of the art of printing, the advantage of metre for purposes of recital being thus superseded, and partly to the evolution of prose forms out of metrical beginnings, as had taken place in the history of classical literature. Prose narratives celebrated Arthur, Charlemagne, Amadis de Gaul, and other heroes of chivalry, and were as wearisome and naive as their predecessors, though composed with more regard to probability, and to some extent depicting manners instead of being mere rhapsodies of fierce encounters. The principal romances of the Arthurian cycle, which is in its essence of Welsh and Armorican origin, are those of 'Merlin the Enchanter,' of 'Arthur,' of the 'Holy Graal,' of 'Percival,' of 'Lancelot of the Lake,' of 'Tristan,' etc. They relate the exploits and loves of the Knights of the Round Table; the scenes are generally laid in Wales, Cornwall, Brittany, Ireland, or Scotland; only in one or two of the series are we transferred to Egypt or India.

Scandinavian.— Scandinavia abounded in legendary romances, both metrical and prose, on national subjects, as the 'Völsunga Saga,' the 'Winkina Saga,' 'Frithiof's Saga,' the 'Saga ot King Ragnar Lodbrok,' and others, all having a bold, vigorous, gloomy character peculiar to themselves.

German.— Germany also had a peculiar cycle of heroes derived from her traditional history as heir of the Roman empire, such as Siegfried, Theodoric, king of the Goths, Dietrich of Bern, Attila (Etzel), king of the Huns, Günther, king of Burgundy, etc. The German romances are of a more fierce and unrefined character than the French, from which they differ, too, in employing the preternatural arts of the subterranean Duergar or dwarfs.

Italian.— The Italians originated no romances of the kind described above. They adopted

from the French the tales of Charlemagne and his paladins, which, however, attracted little attention till Boiardo, Berni, Pulci, and Ariosto made them the groundwork of poems that were diffuse and rambling in style, but far superior in regularity and beauty of diction to the earlier romances. These romances had been known in France two centuries before they were introduced into Italy. The French 'Contes and Fabliaux,' facetious tales of real life, found more favor in Italy, whose political features during the Middle Ages were mercantile and lettered republics instead of feudal chivalric institutions. The first work of this sort is the 'Cento Novelle Antiche,' otherwise called 'Il Novellino.' It is a collection of stories current among the Italian people, or taken from the 'Fabliaux,' the 'Gesta Romanorum,' and some of the more graceful episodes in the chivalric romances, and was executed by unknown authors about the end of the 13th century. It was followed by the 'Decameron' of Boccaccio (1358), which is a collection of 100 tales drawn from all sources, and transcribed in a charming style, but for the most part too indelicate to suit modern taste. Their success was immense, and brought into the field a host of imitators, among whom we can only mention Sacchetti, Ser Giovanni (to whom Chaucer, Shakespeare, and Molière are indebted), Massuccio di Salerno, Agnolo Firenzuolo, Luigi da Porta, Cinthio (from whose works Shakespeare and his contemporaries largely drew), Grazzini, Straparolo, Bandello (in whom we find the original of Massinger's 'Picture' and Shakespeare's 'Twelfth Night'), Malespini, Campeggi, and others. In the 15th century the romances of chivalry had run their course in France, but the tales of love intrigue continued. The principal of these are the 'Cent Nouvelles' and the 'Heptameron' of Margaret of Navarre. A totally different class of fiction popular in this era deserves a word in passing, the spiritual romances. The greatest mediæval work of this character is unquestionably the 'Golden Legend' of Voragine, consisting of 177 sections, each devoted to a particular saint or festival. Besides this there was a species of spiritual tales, the 'Contes Dévots,' written by the monks themselves, probably with the intention of counteracting the influence of the licentious stories of the troubadours, but sometimes falling below their own moral standard. During the 16th and 17th centuries the romance writers began to alter and extend their sphere. The power of the Church had been rudely shaken, the institutions of feudalism were crumbling into decay, and the uniformity which reigned to a great extent in the former modes of life and thought were rapidly disappearing, and a tendency to the other extreme of individualism is clearly discernible.

Spanish.— The 'Don Quixote' of Cervantes was a death-blow to the exaggerated interminable chivalric romance. About the same time the first of the *picaresque* romances was given to the Spanish public. It was written by Matteo Aleman, and entitled 'The Life of Guzman Alfarache'; the hero is successively beggar, swindler, pander, student, and galley-slave. It gave birth to a host of Spanish romances with beggars and scamps as the central figures, and is said to have suggested to Le Sage the idea of 'Gil Blas.'

English.— The more complete development of the English novel is almost contemporaneous with the decline of the tragic drama. As the more violent passions and impulses of society gradually became restrained, the narrative style was called into play to give a more even and detailed development of sentiment and incident than is possible in the drama. The first name of note is that of Mrs. Aphra Behn (the Astræa of the Dunciad), whose tales are as licentious as the plays of the contemporary dramatists, as also are those of her successors and imitators, Mrs. Heywood and Mrs. Manley. The only fictions of the time evincing high poetic talent are Bunyan's allegories, the 'Pilgrim's Progress' and the 'Holy War.' The modern English novel may be said to date from Defoe. The effect of his 'Robinson Crusoe,' 'Colonel Jack,' 'Moll Flanders,' etc., is caused by the delineation and skilful combination of practical details, which give to the adventures the force of realities commanding the interest and sympathy of the observer. The satirist of the age was Swift, the English Rabelais, whose 'Gulliver's Travels' are equally interesting whether read with or without reference to the satire lurking beneath the surface. The novel of every-day life was further improved by Richardson, Fielding, and Smollett. Though the productions of Richardson are of great length, yet their accumulation of delicate light and shade, the knowledge of human sentiments and passions they display, and the earnestness with which they enlisted the passions on the side of virtue, made them a great advance on their predecessors. The novels of Fielding have a less sentimental tendency, are marked by less delicacy of perception and command of pathos, and more by a flow of wild animal spirits, vivacity of manner, grasp of character, and thorough knowledge of all sections of English life. Unlike Fielding, Smollett seized upon the eccentric rather than the common features of character, dealing in humorous exaggeration, grouping together burlesque personages, incidents and oddities of speech and action. His humor belongs more to farce than to genuine comedy. The 'Tristram Shandy' of Sterne displays a phase of humor differing from that of his contemporaries, than which it must be admitted to be deeper and finer in quality. 'Tristram Shandy' has little plot or continuous action, its interest depending on its characters and sentiments; it abounds in happy phrases, keen glances into the depths of human character, and in pathos which is occasionally closely allied to mawkishness. Four years after this work, appeared Goldsmith's 'Vicar of Wakefield,' which possesses a higher moral tone than any that had preceded it. From this time till the beginning of the 19th century no work of fiction of high rank appeared. Then came the works of Miss Edgeworth and Miss Austen, who described domestic life with minuteness, good sense, a clear moral aim, and charming simplicity of style. During the era of the French Revolution a tendency to embody social speculations and aspirations, and to discuss matters connected with religion, appeared, especially in the novels of Bage, Holcroft, and Godwin.

The Modern Novel.— Sir Walter Scott may be said to have created the historical romance as a new department of English literature. His retrospective cast of mind, genial sympathies,

antiquarian research, and creative imagination enabled him to give a vivid, if not always a truthful, reproduction of past characters, manners, thoughts, and passions. He raised a higher standard of novel writing than had been before known, and substituted for the mawkish sentimentalism and ridiculous extravagance which had been long popular, good sense, genuine feeling, power and beauty of description, and life-like impersonations of manly and womanly character in all ranks from the cottage to the throne. Since his day the English novelists are the most numerous class in the list of authors; and we can but mention a few of the more prominent names from that time till the present day. In the novel of English life and manners — besides the great names of Dickens and Thackeray — there are Mrs. Gore, Theodore Hook, Charlotte Brontë, Mrs. Trollope, Anthony Trollope, Mrs. Craik, Disraeli, Lord Lytton, George Eliot, Mrs. Oliphant, James Payn, Charles Reade, Miss Thackeray, Thomas Hardy, Richard Blackmore, George Meredith, etc.; in the historical novel, G. P. R. James, Ainsworth, Lytton, Kingsley, Weyman, etc.; in the nautical world, Marryat, Chamier, Hannay, W. Clark Russell, etc.; in the criminal novel, Ainsworth; in the novel of adventure, Rider Haggard, Rudyard Kipling, and others; among the sensational novelists, Wilkie Collins, Miss Braddon, etc. In the novel of Scottish life we meet with Galt, Prof. Wilson, Hogg, Moir, George MacDonald, R. L. Stevenson, J. M. Barrie, S. R. Crockett, etc.; in the Irish novel, Lady Morgan, Banim, Crofton, Croker, Carleton, Lover, Lever, Mrs. S. C. Hall, etc. The most celebrated of the French novelists of the 19th century were Madame de Staël, Châteaubriand, Victor Hugo, Dumas (father and son), Balzac, Paul de Kock, Alphonse Karr, Georges Sand (Madame Dudevant), Feydeau, Feuillet, Prosper Mérimée, Edmond About, Erckmann-Chatrain, A. de Vigny, Zola, Daudet, G. Ohnet, Pierre Loti, etc. The more noteworthy names in the German literature of fiction are those of Gutzkow, Wilibald Alexis (Wilhelm Häring), Hackländer, Spielhagen, Gottfried and Johanna Kinkel, Rodenberg, G. zu Putlitz, Auerbach, Gustav Freytag, Paul Heyse, Georg Ebers, Peter Rosegger, Louisa Mühlbach, E. Werner, Julius Wolff, and others. Among the most important novels in other languages are those in the Italian by Manzoni and De Amicis, in Danish by Hans Christian Andersen, in Swedish by Frederika Bremer and Madame Carlen, in Norwegian by Björnson and Jonas Lie, in Hungarian by Maurice Jokái, and in Russian by Ivan Turgenieff and Tolstoi. The novel in America will be found treated at length under the title FICTION IN AMERICA.

Novel Constitutions, or **Novels,** in law, were the supplementary constitutions of some Roman emperors, and, especially those of Justinian, so called because they appeared after the authentic publications of law made by such emperors. The Novel Constitutions (also called Novels), together with the Institute, Digest, and Code, constitute the whole body of law which passes under the name of Justinian.

Novelette, (1) in music a term denoting certain compositions in free form, characterized by a great number of short themes introduced without regular succession. Schumann (q.v.) was the inventor of this composition.

(2) An abbreviated novel, or short work of fiction; a short story usually contains from 1,000 to 20,000 words; a novelette from 20,000 to 40,000, and a novel from 40,000 words upward.

Novellino, nō-vĕl-fē'nō, **Il,** or **Cento Novelle Antiche,** a 13th century collection of Italian stories of a very multifarious character taken from every possible source, biblical, classical, chivalrous, and historical. The style is simple and natural and often distinguished by a charming naïveté. Consult: Carbone, 'Il Novellino' (1890); d'Ancona, 'Le Fonti del Novellino'; and Biagi, 'Le Novelle Antiche' (1880).

Novello, nō-vĕl'lō, **Clara Anastasia,** COUNTESS GIGLIUCCI, English vocalist: b. London, England, 10 June 1818; daughter of Vincent Novello (q.v.) and sister of Mary Victoria Cowden Clarke (q.v.). She made her début in 1833, and later sang with brilliant success in the great cities of Europe. In 1843 she was married to Count Gigliucci, and her final public appearance was in 1860.

Novello, Vincent, English composer: b. London, England, 6 Sept. 1781; d. Nice, France, 9 Aug. 1861. He was one of the founders of the Philharmonic Society of London, and of Novello, Ewer & Company, London music publishers. His contributions to cathedral music are valuable, and in editing the unpublished compositions of great musicians he accomplished an important work.

Novem'ber (from *novem,* nine), the eleventh month of our year and the ninth month of the Roman year when it consisted of 10 months. It has 30 days, and in Great Britain is generally regarded as perhaps the gloomiest period of the year. The first day of the month is All Saints' Day. (See CALENDAR.) In the United States Thanksgiving Day comes in November.

Noverre, Jean Georges, zhŏñ zhôrzh nō-vār, French musician and dancing-master: b. Paris, France, 29 April 1727; d. Saint Germain en Laye, France, 19 Nov. 1810. He directed his attention to dancing and the composition of ballets, and in 1775 was appointed "Maître des ballets en chef" at the Académie at Paris. His savings were swept away by the Revolution, but his old age was dignified and respected though poverty-stricken. He wrote: 'Observations sur la Construction d'une nouvelle Salle de l'Opera' (1787); 'Lettres á un artiste sur les Fêtes publiques'; etc.

Novgorod, or **Veliki-Novgorod** ("Great Novgorod), Russia, (1) a town, capital of the government of Novgorod, on the Volkhoff, near the point where it issues from Lake Ilmen, 103 miles southeast of Saint Petersburg. It is divided by the river into two parts, which communicate by a stone bridge. The portion of the town on the right bank contains in its centre the Kreml, or citadel. Within it is the cathedral of Saint Sophia, built after the model of Saint Sophia at Constantinople; besides which there are numerous churches and several monasteries. The town-hall, post-office and commercial building stand on the left bank of the river. The manufactures are of little importance, and consist of sail cloth, leather, tobacco, candles, vinegar, etc. The trade in corn, flax, and hemp, carried on chiefly with the capital, is considerable.

Novgorod was in early times the capital of an independent state. So great was its power and wealth that it excited the jealousy of the Muscovite princes, and in 1478 the Czar Ivan III. nearly destroyed the city, deprived it of its liberties, and banished its most influential citizens. On the opening of Archangel to English traders, but more especially after the founding of Saint Petersburg, the town rapidly declined. Pop. (1897) 26,095. (2) The government of Novgorod has an area of 47,236 square miles. Pop. (1897) 1,392,933, chiefly engaged in agriculture and stock-raising.

Novibazar, or **Novipazar,** Turkey, the capital of the sanjak of Novibazar, Kossovo, on the Rashka, 130 miles southeast of Bosna-Serai. There are no public buildings worthy of notice except the ruined citadel. It is the chief point of communication between Bosnia and Turkey; several of the chief roads of the country cross each other here. By the terms of the Treaty of Berlin of July, 1878, the liva oi district of Novi-Bazar is maintained under a dual Austro-Turkish control. Pop. 12,000.

Nov'ice. See NEOPHYTE.

Novikoff, nŏv'ĭkŏf, **Nikolai Ivanovitch,** Russian author: b. near Moscow, Russia, 27 April 1744; d. there 30 July 1818. He entered the Imperial service, but soon turned his attention to literature, and became editor of the Moscow 'Gazette.' He established in Moscow a Typographical Society, whose purpose was to further inexpensive reprints of valuable books, and he also founded there the first circulating library in Russia, and in various ways endeavored to promote the cause of education. He was imprisoned for writing 'A History of the Jesuits,' and his other works include: 'The Painter'; 'Russian Biographies'; etc. See Gretch, 'Essai sur l'Histoire de la Littérature Russe.' Consult: Luginoff, 'Novikoff and the Moscow Martinists' (1867).

Novikoff, Olga Kireeff ("O. K."), Russian political writer: b. Moscow 1840. Her parents belonged to the nobility, and at 19 she was married to Gen. Novikoff. She removed to England and there found friends among the most eminent statesmen of the day. Her political writings, signed "O. K.," aimed to further an Anglo-Russian alliance and continued the work of her brother who was killed in the Turkish war. She has published: 'Is Russia Wrong?'; 'Friends or Foes'; 'Skobeloff and the Slavonic Cause'; etc.

Novo Cherkaska, nō'vō chĕr-kās'kä, Russia, city, capital of the province of the Don Cossacks; near the Don River, about 40 miles from its entrance into an arm of the Sea of Azof. Anthracite coal mines and rich farm lands are in the vicinity. Two large fairs are held here each year, which bring considerable trade to the city. It has a number of manufacturing establishments, several excellent schools, and a large library. Pop. (1901) 55,000.

No'vum Or'ganum (literally, new method or instrument), a famous work by Francis Bacon, published in 1620. It forms the second part of Bacon's philosophical work entitled 'Instauratio Magna,' 'The Great Restoration' of Sciences. The first part, 'De Augmentis Scientiarum,' is an extension of the previous work on the 'Advancement of Learning.' The third is the 'Historia Naturalis.' The 'Novum Organum' contains the outlines of the scientific or inductive method; namely, that of proceeding from facts to general laws, instead of inferring facts from assumed general principles which have never been proved. This latter, the philosophical and metaphysical method, was repudiated by Bacon, and together with the "superstitions" of theology, was declared to have no place in the new learning. The 'New Method,' therefore, is an attempt at an interpretation of nature from direct observation.

Novy, Frederick George, American chemist: b. Chicago, Ill., 9 Dec. 1864. He was graduated from the University of Michigan in 1886 and studied in Berlin. In 1891 he became assistant professor at the University of Michigan, and was several times promoted until in 1902 he was made professor of bacteriology. He was at Pasteur Institute in Paris in 1897 for the prosecution of his studies, and in 1901 he formed one of the United States commission to investigate the plague in the Orient. He has written: 'Cocaine and Its Derivatives' (1887) and several books in collaboration.

Nowanagar, nō-wä-nạ-gär', or **Nawanuggur,** nạ-wä-nŭ-gŭr', India, the seaport capital of a native Gujarat state in the Kathiawar peninsula, at the mouth of the Nagna, on the Gulf of Cutch, 54 miles east of Rajkot, with which it is connected by a branch railway line. It is noted for its textile manufactures, pearl fisheries, and carries on an active export and import trade. Pop. (1901) 53,844.

Nowell, nō'ĕl, **Increase,** English colonist in America: b. 1590; d. Boston 1 Nov. 1655. One of the original patentees of the Massachusetts Bay Company, in 1630 he came to New England; about 1632 was dismissed from Boston because of his urging the separation of Church and State; and became one of the founders of Charlestown. He was outlawed by the English authorities for failure to appear before them. Nowell was secretary of the colony 1644–9, and was chaplain to the force sent against the Narragansett Indians. He died in poverty, but a large land grant in New Hampshire was voted by the colony to his widow and his son, Samuel (1634–88), who had distinguished himself in the swamp fight with the Narragansetts.

Nox. See NYX.

Noyades, nwä-yäd, in French history, the name given to the execution of political offenders by drowning them, practised during the Revolution, especially during the Reign of Terror, by Carrier et Nantes. The method adopted was crowding the victims into a boat, withdrawing a plug in the bottom, and casting them adrift.

Noyau, nwŏ-yō', a French liqueur prepared from white brandy, bitter almonds, sugar-candy, grated nutmeg and mace, and sometimes flavored with the kernels of apricots, peaches, the peel of oranges, etc.

Noyes, noiz or nois, **Arthur Amos,** American chemist: b. Newburyport, Mass., 13 Sept. 1868. He studied at the Massachusetts Institute of Technology and at Leipsic University, and became instructor 1887, assistant professor 1894, and professor of theoretical and organic chemistry 1899, in the Massachusetts Institute of Technology. He made valuable original

studies of the relation of the law of mass action to the solubility of salt mixtures, contributed other papers to the 'Zeitschrift für physikalische Chemie,' and wrote: 'A Detailed Course of Qualitative Chemical Analysis of Inorganic Substances' (1895); 'Class Reactions and Identification of Organic Substances' (1899, with Milliken); and 'General Principles of Physical Science' (1902).

Noyes, John Humphrey, American author and founder of the Oneida Community (q.v.): b. Brattleboro, Vt., 6 Sept. 1811; d. Niagara Falls, Canada, 13 April 1886. His father was a representative in Congress 1815–17, and his mother an aunt of President R. B. Hayes (q.v.). He studied at Dartmouth, took theological courses at Andover and Yale, was licensed to preach in 1833, and soon lost this license, having professed second conversion, a belief in the dual sexual nature of God, and the doctrine that the Christian is bound by no rule of duty or conduct. With these tenets and an attempted return to the communism of the primitive Church, he gathered round him a Perfectionist Community at Putney, Vt., whose practice of complex marriage forced them to migrate to Oneida, N. Y. But there, too, they outraged public sentiment, so that they gave up their peculiar tenets in 1880, and Noyes and some of his adherents removed to Canada. He wrote: 'The Berean,' which may be called the 'Bible of the Oneida Community' (1847); 'The Second Coming of Christ,' that is in 70 A.D. (1859); 'Salvation from Sin' (1869); and 'History of American Socialism' (1870). See PERFECTIONISTS; ONEIDA COMMUNITY.

Noyes, William Albert, American chemist: b. near Independence, Iowa, 6 Nov. 1857. He was graduated from Iowa College in 1879, and in 1883–6 was professor of chemistry in the University of Tennessee, since when he has occupied the chair of chemistry at the Rose Polytechnic Institute at Terre Haute, Ind. He has edited the 'Journal of the American Chemical Society' since 1902, and is the author of: 'Organic Chemistry for the Laboratory' (1897); 'Organic Chemistry' (1903); etc.

Noyes, William Curtis, American lawyer: b. Schodack, N. Y., 19 Aug. 1805; d. New York 25 Dec. 1864. He was admitted to the bar in 1827, was appointed district-attorney of Oneida County, and later established a law practice in New York. He was one of the strongest advocates at the New York bar, and earned a reputation for highest integrity, and at the time of his death was engaged in codifying the laws of the State. He willed his extensive law library to Hamilton College, Clinton, N. Y.

Nu, noo, or **Nuu** (later form Nun), Egyptian deity. It was from Nun, the primeval flood, that Re, the sun-god, rose to his throne over the world. Nun was the personification of the original and eternal stuff or protoplasm from which gods and men were formed, but in a later age represented the life-giving waters of the Nile. Consult Wiedemann, 'Religion of the Ancient Egyptians' (1897).

Nuba, noo'bä, an ethnological name given to the negro tribes of Kordofan, in Eastern Sudan. The Nubas are true negroes. Consult Stanford, 'Africa' (1895).

Nubar Pasha, noo'bär päsh'ä, Egyptian statesman: b. Smyrna January 1825; d. Paris 14 Jan. 1899. An Armenian Christian, he was educated in Switzerland and France, in 1842 became secretary to Boghos Bey, Egyptian minister of commerce and foreign affairs, later rose to be bey, and was sent on important diplomatic missions. Under Said Pasha he was in charge of the transport service through Egypt to India, and built the railway across the desert from Cairo to Suez. After the accession of Ismail Pasha, who at first strongly relied upon him, he was Egypt's first minister of public works, and from 1866 minister of foreign affairs. He successfully concluded at Constantinople and Paris the negotiations toward the construction of the Suez Canal, obtained for Ismail the title of Khedive, and strove to introduce European culture and methods of administration. At that time in Egypt the consulates of 17 various powers administered as many different codes of law, and to these courts alone the subjects of the said powers were amenable. Nubar prevailed upon the powers to allow the organization of international courts with a uniform code, perhaps his greatest achievement. He was dismissed in 1874, but on demand of the powers was at the head of the ministry in 1878–9, directing the financial reforms. In 1884–8 and 1894–5 he was again premier. He was very adaptable, not to say pliant, and readily became the administrator of a British policy of which he did not approve.

Nubia, nū'bĭ-ạ, Africa, a comparatively modern name for a large region, formerly a portion of Ethiopia, and extending on both sides of the Nile from Egypt to Abyssinia; touching the Red Sea on the east and the desert on the west. Nubia proper, or Lower Nubia, extends from Assuan on the Egyptian frontier to Dongola; beyond that is Upper Nubia. But of late the name of Egyptian Sudan, properly applicable to a section of Upper Nubia, has come to be used for Nubia in its widest sense, together with the once Egyptian territory actually in the Sudan, and the equatorial provinces. The great Nubian Desert lies east of the Nile, opposite the great west bend of the river. See EGYPT; SUDAN.

Nuble, ñoo'blā, Chile, an inland province; bounded on the north by Linares, on the east by Argentina, on the south and west by Concepcion; area, 3,556 square miles. It is an agricultural region in which the chief product is wheat, and considerable attention is given to raising cattle. Capital, Chillan. Pop. (1903) 160,823.

Nu'cleopro"teids, products of the compounding of nuclein with proteids. They are compounded in varying proportion, but nearly all cell-nuclei contain them. On digestion with gastric juice an insoluble residue of nuclein is left by nucleoproteids.

Nuddea, nŭd'ē-ä. See NADIA.

Nudibranchia'ta, one of the two primary divisions (orders or sub-orders) of the opisthobranchiate gastropods. The name is in allusion to the absence of the primary gills or ctenidia, which in mollusks occur typically within the mantle cavity, and the functional substitution for them of external processes or cerata which perforate the mantle when the latter is present. The cerata differ greatly in form and arrangement, and their peculiarities characterize the dif-

ferent families. They may be retractile or not; armed with stinging cells or without them; simple, pronged or arborescently branched, in the latter case usually penetrated by portions of the complexly ramifying liver. In their arrangement they may form dorsal or lateral rows, or a circle about the arms. Frequently they are most beautifully colored, and in many cases closely resemble the object on which the animal lives. The young are provided with a nautiloid shell, which is lost early in life, leaving the adult devoid of this protection. A mantle may or may not persist, and the integuments are frequently filled with calcareous spicules. On the head are found a pair of minute sessile eyes, and a pair of often retractile tentacles, which are olfactory in function and are known as rhinophores; in addition to which there may be a second pair of tactile tentacles. The mouth is provided with a radula and sometimes with jaws. Because of the usually elongated form of the body and their strictly marine habit, the nudibranchs are known popularly as "sea-slugs." With the exception of a few free-swimming, pelagic, and parasitic forms, the vast majority of the species belong to the littoral zone, where they creep upon algæ, hydroids, polyzoans, and similar organisms, which afford them concealment and a place to attach the gelatinous capsules in which the eggs are deposited, besides furnishing the animal or vegetable food on which the particular species subsists. Most, if not all, of them are hermaphrodites. Upward of 1,000 species have been described and arranged in 17 families. On the Atlantic coast of the United States 21 genera and 33 species occur in the region north of Cape Hatteras.

Nueces, nwā'sĕs, a river in Texas, has its rise in a ridge of low mountains in Edwards County, flows south into Dimmit County, then east, northeast, and southeast into Corpus Christi Bay. It formerly marked the boundary of the province of Texas in Mexico. It is about 400 miles long and navigable only a short distance from the Gulf.

Nueva Cáceres, nwā'vä kä'thā-rĕs, Philippines, formerly Naga, a pueblo and capital of the province of Ambos Camarines, situated in the southern part of the province on the Naga River at the head of navigation for large vessels, 10 miles inland from San Miguel Bay. It is a port of entry and an important road centre, and has an excellent trade. It is well built, contains a government house, a cathedral and episcopal palace, a seminary, hospital, parochial school, and a normal school for girls. It was at one time the seat of the episcopal see of the Philippines. Pop. 11,550.

Nueva Ecija, ā'thē-hah, Philippines, a province of central Luzon, having a coast line of 23 miles on the Pacific, and bounded on the north by Pangasinán and Nueva Vizcaya, and on the south by Infanta and Bulacán. The surface is mostly low, but is broken in the northeast and south by foothills of the Cordilleras; the Grande de La Pampanga River crosses the province from north to south, the Canarén tributary of the Agno follows the northwestern boundary, the Pampanga Chico, the southwestern; many smaller rivers are tributary to these. The soil is very fertile, the larger rivers frequently overflowing and fetilizing the fields with their deposits. Rice is raised in the southern and central portions; other important products are corn, tobacco, sugar, and papay. The chief industry is agriculture; there are some manufactures for home consumption only; sugar is in some cases manufactured and refined on the sugar plantations. Cattle are raised in the central part of the province. A road parallels the entire course of the Grande de la Pampanga River; there are numerous other roads, and a large boat traffic along the Pampanga and its tributaries. Civil government was established in Nueva Ecija in June 1901, and at the end of that year the governor reported that the province was "free from insurrectionary movement." Pop. 156,610, mostly Tagalogs.

Nueva Esparta, ās-pär'tä, Venezuela, a state composed of islands off the northwest coast of the republic. Margarita is the largest island of the group. Nueva Esparta was a part of the state of Guzman Blanco until 1901, when it became a separate state.

Nueva Leon, lā-ōn' ("New Leon"), Mexico, a state in the northeastern part, bordering on the United States; area, 23,592 square miles. It is crossed by low mountain ranges, but has many fertile valleys, in which the chief products are cotton, rice, and fruits. The chief minerals which are mined are gold, silver, salt, and lead. The capital is Monterey (q.v.). Pop. (1895) 309,252; (1900) 326,940.

Nueva San Salvador, sän säl-vä-dōr', Salvador, Central America, city in a mountainous region a little northwest of the centre of Salvador. The chief occupation is mining. Pop. (1901) 13,000. See SALVADOR.

Nueva Vizcaya, vēth-kä'yä, Philippines, a province of the island of Luzon, situated south of the centre of Northern Luzon, bounded on the east by the province of Isabela, and on the west by Pangasinán and Benguet; area, 1,075 square miles. The surface of the province is uneven, being broken by the foothills of the Sierra Madre, the Cordillera Central and the Caraballo range. The Magat tributary of the Grande de Cagayán River crosses the province from northwest to southeast, and there are numerous smaller rivers and streams. The only crop raised to any extent is rice; sugar, chocolate, and tobacco are also raised, but not in sufficient quantities to supply the inhabitants of the province. Several kinds of building stones, granite, sandstone, etc., are found in the mountains, but quarried only to a small extent; there are also valuable forests containing resin and gum trees, but these products are not gathered on account of the difficulty of transportation. A few simple fabrics are woven for domestic use. The main highway of Luzon from Manila to Aparri passes through this province, but there is but little traffic on account of the difficulty of reaching the interior. Civil government was established for the province in January 1902; and a special form of municipal government organized for a few of the larger towns, which is to be extended to other towns when they are prepared for it. Pop. 60,630, mostly non-Christian tribes.

Nuevitas, nwā-vē'tās, Cuba, seaport in the province of Puerto Principe, in the northeast part of the province, on the coast, and on the railroad which extends 39 miles to Puerto Principe (q.v.). It has an excellent harbor and a large trade with other seaports of Cuba, the

West Indies, and the United States. Pop. (1902) 5,685.

Nuevo Laredo, nwä'vō lä-rā'dō, Mexico, town in the state of Nuevo Leon; on the Rio Grande, and on the Mexican National Railroad. It is opposite Laredo, Texas, and about 160 miles north by west of Monterey. Pop. 2,500.

Nuisance, in law, a term used to denote whatever is a serious annoyance to one's neighbors, or in a general sense to the public at large, in the exercise of their rights of property. Nuisances are of two kinds — public or common, and private. Public nuisances are: Annoyances in the highways, bridges, and public rivers, by rendering the same difficult or dangerous to pass, either by actual obstructions or by want of repair; injurious and offensive trades and manufactures, which, when hurtful to individuals, are actionable, and when detrimental to public health or convenience, punishable by public prosecution, and subject to fine according to the nature of the offense; keeping hogs in a city; disorderly houses, unlicensed plays, gaming houses, and brothels; lotteries; making and selling fireworks in unlicensed places. The storing of petroleum is also strictly regulated. Suffering any mischievous dog to go loose, to the danger of neighbors or passengers, is an indictable offense, and an action for damages will also lie against the owner; but it will not lie unless the owner has had notice of the dog having bitten somebody at least once before. In general, the owner of any vicious animal seems bound to secure it at all events, and is liable for damages to a party subsequently injured if the mode he has adopted to secure it proves to be insufficient. A private nuisance may be defined as an injury or annoyance to the person or property of an individual. If a person builds a house so near to that of his neighbor that the roof of the new building overhangs that of the other, and throws the water on it, this is a private nuisance, for which an action will lie. And if a house is built so near that it will obstruct the light and windows of another, the owner of the new house subjects himself to an action. But depriving one of a mere matter of pleasure — as of a fine prospect, this, as it abridges nothing really necessary or convenient, is not an injury for which there is legal remedy. To keep hogs near one's house, or to carry on any offensive trade — as a tanner, tallow-melter, soap-boiler, or the like — are all nuisances for which an individual has remedy by action. So also is it a nuisance if life be made uncomfortable by the apprehension of danger, or by employing a steam engine, which produces a continual noise and vibration in the apartments of a neighbor. Besides the remedy by action, injured parties may, in a clear case, take the law into their own hands, and remove or abate the nuisance, but it is never advisable to take this course. In all municipal codes there are elaborate provisions with reference to sewers and drains, the disposal of sewage, scavenging and cleansing, water supply, cellar dwellings, and lodging houses, the prevention, abatement, etc., of nuisances, offensive trades, unsound meat, infectious diseases, and hospitals, mortuaries, highways and streets, lighting of streets, public pleasure grounds, markets, and slaughter houses, police regulations, prosecution of offenses, alteration of areas, etc. The overcrowding of houses may be stopped. Provisions are also made to prevent the spread of diseases in times of epidemics, and to prevent common lodging houses from being kept in an unclean state. The inspector of nuisances or the medical officer of health has at all times power to inspect any animal, carcass, meat, poultry, game, fish, fruit, vegetables, corn, bread, or flour, and if found unfit for food, or diseased or unsound, they may be carried away and destroyed, and the owner or dealer fined. The local authority may order house proprietors to provide proper water closets, to cleanse gutters and cesspools, and to remove any pool, ditch, drain, urinal, or privy injurious to health.

Nukha, noo'khä, Russia, town in Transcaucasia, about 120 miles east by south of Tiflis and 150 miles northwest of Baku. It is near oil fields and is the industrial and commercial centre of a silk-producing region. The inhabitants are mostly Armenians and Russians. Pop. (1903) 26,752.

Nukualofa, noo-koo-ä-lō'fä, Friendly Islands, the capital of Tonga, the largest island of the group. See FRIENDLY ISLANDS.

Nüll, nül, **Edward van der,** Austrian architect: b. Vienna 9 Jan. 1812; d. there 3 April 1868. He was professor of architecture and ornamentation in the Vienna Academy, and a prominent practising architect. Most of his designs were executed with August von Siccardsburg. These include the Larisch palace and the Opera, at Vienna. Nüll's style was largely Renaissance, inclining to late Renaissance and rococo, and he exercised a decided influence on the architectural development of Vienna.

Nullification, in American history, a political doctrine first suggested in the Kentucky Resolutions of 1798. Its fundamental principle was accepted by the Hartford Convention of 1814, but it was not until 1832 that the theory was fully developed by the master mind of Calhoun, and acted on by South Carolina in its famous Nullification Ordinance of 24 November of that year. The Federal Constitution recognized both the Union and the States as bearers of power, but did not clearly apportion it between them, nor clearly determine in cases of disputed claims which was the final arbiter. The nation possessed only delegated authority, while to the States remained the residuary powers. Calhoun in elaborating this doctrine claimed that historically the States came into being first, and were the creators of the Union, the grantors of power to their agent, the Federal government. It followed, therefore, as a natural consequence, that the final judge of the amount of power granted could not lie with the created — the agent — but must remain with the States as the creator. Also at this point the question arose in regard to the remedy should the agent of the States exceed the authority delegated, and pass laws that were contrary to the reserved rights of the partners in the Union. The fundamental basis then of nullification as Calhoun developed it was State Sovereignty (q.v.); and, in cases where the Nation was encroaching on the reserved rights of the States, he found in nullification a peaceable remedy. Secession and revolution were thus to be made unnecessary. The Union was as perfect after as before nullification. All rights and duties of the States and the Union remained unchanged except in regard to

the one nullified and therefore void law. Should any of the co-States desire to test the matter a constitutional convention might be called, and the question be settled by process of amending the constitution; but till overruled in this way the law was void in the nullifying State.

The cause of nullification is bound up in a compound of the protective tariff and sectional slavery. The former offered the immediate occasion for its promulgation, while the conditions that made protection popular in one section, and hated in the other, were found in the latter. As late as 1816 the South was not radically opposed to a protective tariff. But under the slave system manufactures and commerce did not develop. The South therefore could not profit by the protective system, and gradually developed a strong opposition to its continuance. By 1828, under the teaching of President Thos. Cooper, of the University of South Carolina, public opinion in that State had come to hold that the producer and not the consumer paid the tariff duty. It was also noted that about three fourths in value of all exports from the United States consisted of the products of the South, cotton, rice, tobacco, etc. Therefore, in harmony with Cooper's teaching, the South paid approximately three fourths of the government revenues derived from imported goods. Hence the demand for lower duties grew apace. But instead of lower rates the tariffs of 1824 and 1828 raised them. The tariff of 1828—"the tariff of abominations"—aroused Calhoun to seek a remedy. In that year he set forth his nullification theory tentatively, but did not press for action under it. By 1832 the National debt having been extinguished, the South at once began to demand a lower tariff, insisting that the extinction of the public debt removed all excuse for the longer continuance of high duties — of protection. Instead, however, of revising the tariff in 1832 in such a way as to reduce it to a revenue standard, the duties in the new law were placed on a protective basis, and that principle affirmed to be adopted as a permanent one. In South Carolina, for some years, a struggle between the nullifiers and the anti-nullifiers to control the legislature had been in progress. The tariff act of 1832 for the first time gave the necessary two thirds majority to the nullifiers, and on 24 Oct. 1832 the senate by a vote of 30 to 13, and the house by 99 to 25 resolved to call a convention to meet 19 November. On 24 November the convention voted 136 to 26 to declare the tariff acts of 1828 and 1832 null and void, because beyond the powers delegated to the United States. The convention also authorized the legislature to pass all laws necessary to enforce the ordinance of nullification. Laws were accordingly passed to prevent the collection of the tariff within the State, to give to the governor the power to call out the State militia, and to give the State courts full control of all cases involved under the tariff laws.

President Jackson in his annual message of December 1832 barely noticed this nullification action, but in his celebrated Proclamation of 10 Dec. 1832 he discussed the subject in all its aspects. He denied the possibility of nullification being a peaceable remedy. He asserted the National as opposed to the States Rights interpretation of the Constitution, and concluded with an earnest plea for the Union. He appealed to the people of South Carolina not to be misled, not to be deceived into thinking that their action could end short of war and treason. He pictured their fate and the fate of the Union should they persist in their policy. In the meantime Congress had taken the matter into consideration. The great Webster-Hayne debate of 1830 had awakened the people to a realization of the issue. Now in February 1833 Calhoun and Webster were pitted against each other in the Senate of the United States, in the greatest constitutional discussion concerning the nature of the Union and the powers of the States that had ever occurred in the American Congress. Webster supported Jackson in his national views, while Calhoun reaffirmed the constitutionality of nullification, as a peaceable remedy, against the usurpation of power by Congress. Webster presented the Supreme Court as the final arbiter in disputed cases. Calhoun claimed that this would be making the agent the judge of his own powers — an impossible principle. The request of the President that he be granted increased powers was now met by the introduction of the so-called Force bill 21 January. The bill, however, made no progress until the introduction of Clay's Compromise Tariff bill 12 February. The two measures then moved forward with equal step. The one gave the President power to collect the revenues in South Carolina, using the whole power of the government for the purpose, if necessary; the other provided for a gradual reduction of the tariff duties, until by 1842 no duty should exceed 20 per cent, a revenue basis. The two measures reached the President at practically the same time:—he signed them both 2 March 1833, and on 16 March South Carolina repealed her ordinance of secession. Both parties could thus claim a victory; the administration and its friends, as well as Clay, in that the protective tariff still existed; the nullifiers in the fact that provision was made to reduce the tariff to a revenue basis, thus in fact yielding to South Carolina, at the very moment of adopting the Force bill.

Nullification as a constitutional and peaceful remedy against oppression was never again asserted, but the basis of the theory — the doctrine that the States were sovereign — was not abandoned. In fact it was advocated even more strenuously than before. Instead of nullification *in* the Union, as a remedy, the doctrine of secession — a separation *from* the Union — gradually became the accepted principle of the States Rights school of statesmen. The advocates of the latter view held that to nullify a law and remain a member of the Nation was absurd; but affirmed that in case of a breach in the compact to withdraw from the Union was a constitutional right that flowed naturally from the character of the Union. Consult: Von Holst, 'Constitutional History of the United States,' Vol. I.; Powell, 'Nullification and Secession in the United States'; Niles, 'Register' (Vol. 43); Richardson, 'Messages; Debates in Congress' (1832–3); Calhoun, 'Works'; Webster, 'Works,' Vol. III.; Houston, 'A Critical Study of Nullification in South Carolina.'

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Nul'lipore, a name given to certain more or less massive sea-weeds of the family *Rhodo-*

phyceæ, common on rocky shores in warm climates, and especially about coral islands, where they serve to protect the corals somewhat against the beating of the waves. From secreting lime on their surface, and hence resembling coral, they were formerly supposed to be a kind of zoophytes. Some small species occur on the northern Atlantic coasts.

Numa Pompilius, nū'ma pom-pĭl'ĭ-ŭs, 2d king of Rome, belonging to the legendary period of Roman annals. According to ancient accounts he was from Cures, in the land of the Sabines, and was distinguished for wisdom and piety. He was elected king after the year's interregnum following the death of Romulus. His lengthy and quiet reign he devoted to the adequate establishment of religion; and to him the Romans ascribed their whole system of worship. He also founded the temple of Janus, which during his rule remained closed. The sacred books of Numa, containing the prescribed manner of observance for the rites and ceremonies of religion, were said to have been entombed, and to have been discovered in 181 B.C. This story is now regarded as a forgery.

Numantia, nū-măn'shĭ-ạ, Spain, an ancient town, situated on the Douro, near the place now called Soria in Old Castile. It is famous for its resistance to the Roman power. While the neighboring places yielded to the Romance the Numantians were firm in refusing submission. Large forces under the prætor Pompeius Aulus (137 B.C.) and the consul Hostilius Mancinus were repulsed. Scipio Africanus, the younger, with an army of 60,000 was sent to subdue them. He surrounded the town and famine compelled them to yield after a siege of 14 months. The conqueror destroyed the town, 133 B.C.

Num'bering Machine, in printing, a machine for impressing consecutive numbers on account or record books, coupons, railway certificates, bank-notes, railway tickets, etc. The invention is that of Blaise Pascal (1650), and consists of disks or wheels decimally numbered on their peripheries, the whole mounted on one axle upon which they turn freely, acting upon each other in serial order. The first wheel of the series containing the units is moved one figure between each impact, and when the units are exhausted the tens come into action, and act in coincidence with the units, which continue their action.

Numbers, Book of, the fourth book of the Pentateuch, named in the Hebrew Bible 'The Wilderness,' from a word which appears in the first verse. The English title is a rendering of the Septuagint designation, which refers to the "numberings" of the people narrated in chapter i. 26. As the book opens at Sinai, like Leviticus, so it contains a continuation of the enactments given in that book. It is also connected with Deuteronomy, which takes up the narrative at the plains of Moab, the point in the people's wanderings at which Numbers ends.

Contents of Numbers.— The book may be divided into three parts, each of which places the scene of its incidents in a different locality. (1) The scene is Sinai in the first part. The desert march is to begin by a numbering of the people. A separate census of the Levites is taken, as also of the first-born males. This is followed by regulations for the lepers' banishment from the camp; the law of restitution; the "waters of jealousy"; the law of the Nazarite; the form of priestly blessing. The offerings made by the princes at the dedication of the tabernacle are then enumerated. The Levites are set apart for their sacred office; the Passover observed by all ceremonially fitted for the observance; the guidance of the pillar of cloud described. (2) The second part relates the incidents of the journey from Sinai to the plains of Moab, and extends from the 2d to the 40th year after the Exodus. It is made up of the following disjected episodes: the murmurings at Taberah and Kibroth-hataavah; the institution of the seventy elders; the spying out of the land; the revolt of Miriam and Aaron; the consequent leprosy of Miriam; the stoning of the sabbath-breaker; the judgment of Korah and his company; the enactment of certain ceremonial laws. These events took place at Kadesh. The narrative proceeds with the journey from Kadesh to Edom, relating the victories over Sihon and Og and from Edom to the plains of Moab, relating the death of Miriam; the faithfulness of Moses and Aaron at Meribah; the death of Aaron at Mount Hor; and the visitation of fiery serpents. (3) The third part narrates the incidents that occurred in the plains of Moab; Balaam's prophecy; the idolatry at Shittim; the second numbering of the people; the appointment of Joshua to succeed Moses; the partition of the Promised Land; appointment of Levitical cities and cities of refuge; encounter with the Midianites.

Literary Characteristics.— These recall Exodus in its chronological dislocation and mixture of narrative and legislation. The Book of Numbers contains some remarkable fragments of old Hebrew poetry. It is brief in comparison with the length of time covered, there being little record of about thirty-eight years spent in the wilderness. The beginning of the narrative is a pretty full account of the first fourteen months of the journey, this completeness of detail is again resumed in the record of the closing year.

Consult: Driver, 'Introduction to the Old Testament'; Addis, 'Documents of the Hexateuch' (1898); Carpenter and Battersley, 'The Hexateuch' (1900); Briggs, 'The Hexateuch.'

Numera'tion, the art of expressing in characters any number proposed in words. The chief terms used for this purpose are the names of the digits from one to ten, a hundred, a thousand, a million, etc. The term billion is of uncertain use: in Britain it is a million of millions; in France, America, etc., a thousand millions.

Numer'ical Aperture, a term used in optics; the method by which the illuminating and resolving power of high-power microscopic objectives is calculated. Since it became customary to interpose water, oil, or other fluid between the object and the lens, it is found that a water immersion lens of 97½°, and an oil immersion of 82°, give equal results to a dry or air lens of 180°. This obviously depends on the diameter of the back lens of the objective, and this on the refractive index of the medium between lens and object. It is expressed by the formula, $n \sin u$, where n is the refractive index of the medium — air or fluid — and u the semi-angle of aperture. It is thus found that an oil-lens of 180° has a numerical aperture of 1.52 against 1.00 for 180° in air. This only repre-

sents the comparative diameters of the effective pencils, and the relative illumination is, of course, obtained by squaring the numerical apertures to get the comparative areas of the pencils. We thus find that an oil-lens of 180° gives 2.310 the illumination of a dry objective of 180°.

Numerical Notation, in music, a modern system of indicating single tones or entire chords by means of numerals. The system is especially used in indicating the range of various instruments. Roman numerals are used in violin music and Arabic figures in compositions. The system was first introduced by G. Weber. See MUSIC; TONES.

Numidia, nū-mĭd'ĭ-ạ, Africa, the ancient Roman name for the region now corresponding roughly with modern Algeria. It was divided among various tribes, but after the second Punic war it was united under Masinissa, and several of its rulers became noted in Roman history, more especially Jugurtha. In 46 B.C. it became a Roman province. Under the Roman emperors Numidia attained a high degree of prosperity, and Christianity was in a flourishing condition here. It was afterward conquered by the Vandals, later by the Arabs, and in modern times by the French.

Numismat'ic and Archæological Society, The American. See AMERICAN NUMISMATIC AND ARCHÆOLOGICAL SOCIETY.

Numismat'ics, the science which treats of coins and coinage and the authorized government issue of money from the archæological, historical, artistic and economic viewpoint. The word is derived from the Greek *nomisma,* through the form sometimes found in Latin, *numisma,* signifying coin. The name of coins is given to the pieces of metal on which the public authority has impressed different marks to indicate their weight and value, to make them a convenient medium of exchange. The study of coins is regarded as indispensable to archæology, and to a thorough acquaintance with the fine arts. They indicate the names of provinces and cities, determine their position, and present pictures of many celebrated places. It is from coins that we derive all our knowledge of some of the most celebrated works of ancient art, particularly of ancient statuary. Coins likewise fix the period of events, determine sometimes their character, and enable us to trace the series of kings. They enable us to learn the different metallurgical processes, the different alloys, the mode of gilding and plating practised by the ancients, the metals which they used, their weights and measures, their different modes of reckoning, the names and titles of the various magistrates and princes, and also their portraits; the different divinities, with their attributes and titles, the utensils and the ceremonies of their worship.

Design and Form.— The parts of a coin are the two sides. (1) The obverse side, face, or head which contains a portrait of the person at whose command or in whose honor it was struck, or other figures relating to him. This portrait consists either of the head alone or the bust, or of a half or full length figure. (2) The reverse contains mythological, allegorical, or other figures. The words around the border form the legend; those in the middle the inscription. The lower part of the coin, which is separated by a line from the figures or the inscription, is the basis, and contains subsidiary matter, as the date, the place where the piece was struck and other data. In ancient as in modern times, while the coins of empires or kingdoms were distinguished by the head of the reigning prince, those of republics and free states were distinguished by some symbol, and sometimes these symbols are found along with the head of a reigning prince. These symbols were sometimes chosen on account of an accidental similarity between the name of the symbol and that of the state. Thus, a rose was the symbol of Rhodes; a heart that of Cardia; a pomegranate that of Pamphylia. More frequently, however, the symbols had some local reference. Thus, Egypt was distinguished by a sistrum, an ibis, a crocodile, or a hippopotamus; Arabia by a camel; Africa by an elephant; Athens by an owl; Crete by a labyrinth, and Syracuse and Corinth by a winged horse. In shape most coins are circular, although some have been oblong-oval, octagon, and even square. Coins are usually of gold, silver or copper, and occasionally of brass, white metal, nickel, tin, lead or bronze. More rarely an alloy of gold and silver, or an alloy of silver and tin, were used. There were also coins made with the main body of copper, but with a thin covering of gold or silver, either laid on the form of a thin plate, or by dipping the coin in the molten metal.

Numismatic Science.— The study of coins appears to have been entirely unknown to the ancients. It does not appear from any ancient works that any value was set upon coins as curiosities by the collectors of works of art in the times of Augustus, though there were at that time series of coins of cities, some of which have come down to us, and attract attention on account of their antiquity and the beauty of their execution. In the 15th and 16th centuries kings and queens, and private individuals of wealth and culture, particularly in Italy, France and Germany, rivaled each other in zeal for collecting these remains of antiquity, at first principally with a view of obtaining portraits of the chief characters of Roman history. Learned treatises soon succeeded these first collections, in which the chief attention had been paid to striking impressions. The earliest treatises were those of the Italian Enea Vico and the Spaniard Antonio Agostino, both published in the 16th century. In the 17th and 18th centuries, the investigations into the mixtures of metals and the execution of the dies; the form, size, weight, value, and number of the ancient coins; their genuineness or spuriousness, became susceptible of more certainty by the accumulation of materials of comparison; and the understanding of the types and legends was also facilitated by similar means. The coins of the Middle Ages have been sought for with zeal, and along with the ancient coins have been made to throw light upon subjects which manuscripts and writers left unexplained. The literature of numismatics has now become very extensive, but much of it is comprised in periodicals and pamphlets. From a numismatic standpoint, the value of a coin depends largely upon its condition. There are 11 clases, namely: Proof, Uncirculated, Circulated Very Fine, Fine, Very Good, Good, Very Fair, Fair, Poor and Very Poor. Proofs are those coins struck for

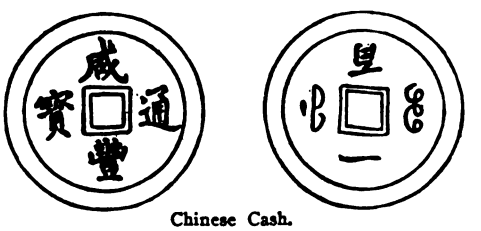
collectors and not designed for general circulation. They have a polished mirror-like surface and bring the highest prices when offered for sale. Uncirculated coins are strictly unused, being in the same condition as when first issued from the mint, showing no sign of the least rubbing or wear. Circulated coins are those which have been in circulation barely long enough to wear off the mint lustre without rubbing the metal. The size of coins is reckoned by numismatists in the United States in sixteenths of an inch.

Ancient History.— We have no accurate knowledge of the beginning of coinage. Abraham returned from Egypt nearly 2,000 years before Christ "very rich in cattle, in silver and in gold"; and in his purchase of the cave of Machpelah he weighed out the consideration agreed upon, "400 shekels of silver, current money with the merchant." The use of metals, however, in the form of wedges or bars, though a great advancement upon simple barter, or the use of grain, cattle or other commodities, was still attended with inconveniences. "At every transaction the precise weight of metal must be computed; a hammer and chisel must be at hand to cut it off and a balance to weigh it. The fineness of the metal was also to be ascertained." The method of shaping the metal into pieces of convenient size and stamping upon each its exact value ended all these troubles. He who first did this was the inventor of coins; but history is silent respecting his name, his country or the date of his invention. Homer speaks of the workers in metals but makes no mention of coined money. Herodotus says that the invention was Asiatic and that as far as he knew, the Lydians were the first who struck money, and although the oldest coins now extant have usually been supposed to be Grecian, there are reasons for thinking that the invention was Asiatic. Bricks of clay were a primitive coin employed by China, Arabia and Siam before copper money came into general use. Clay was mixed with glue, stamped with a stamp, after having been made into small bricks. Egypt in ancient days made money of several substances. Parchment, leather, pasteboard, wood, covered with wax, and papyrus were employed. They also used scarabæi, which were stone and pieces of clay molded into the shape of beetles and tortoises. This was 2,800 years before Christ. Unless marked by authority they passed only at their commercial value; if marked, their value was enhanced.

Greek and Roman.— The coins of Greece and Asia Minor are the earliest known to the numismatist. The coins of the kings of Macedon are the most ancient bearing portraits; and Alexander I., who commenced his reign about 500 years before Christ, is the earliest monarch whose coins have yet been found. Then succeed the sovereigns who reigned in Sicily, Caria, Cyprus, Heraclea, and Pontus. Afterward comes the series of kings of Egypt, Syria, the Cimmerian Bosporus, Thrace, Parthia, Armenia, Damascus, Cappadocia, Paphlagonia, Pergamos, Galatia, Cilicia, Sparta, Pæonia, Epirus, Illyricum, Gaul, and the Alps. This series reaches from the era of Alexander the Great to the Christian era, comprising a period of about 330 years. A perfect and distinct series is formed by the Roman emperors, from Julius Cæsar to the overthrow of the empire by the Goths. The Roman coins may be resolved into three great divisions, those of the older republic, the consular, and imperial. The consular coins seldom or never bore the names or titles of consuls till toward the close of the republic; nevertheless they are not improperly called consular, because they were struck in the consular times of Rome. These have also been denominated "coins of families," and are arranged according to the names inscribed on them. The brass consular coins are rather uninteresting and few. The imperial coins were those struck after the conclusion of the republican era of Rome down to the fall of the Roman Empire. Some of these coins are artistic; but they are for the most part rude and uninteresting. The materials of which they were composed were, as in modern times, gold, silver and the various modifications of copper.

The Middle Ages.— The money of the Byzantine Empire forms a link between ancient and modern coinage. The gold solidus or nomisma was circulated in the west as well as the east of Europe. Then came the silver piece or penny. The Scottish copper coinage, which was of an earlier date than that of England, was preceded by money of bullion, called black money, consisting of copper washed with silver. There are many coins of William I. in 1165; and a large hoard of his pennies was found in 1780. The only silver coin was the penny until the year 1293, when Alexander III. coined also half pence; and there are silver farthings of Robert I. and David II. The groat and half-groat were also introduced by the latter. These all ceased to be coined in the time of Queen Mary, when shillings were first coined, with the bust of the queen on one side and the arms of France and Scotland on the other. The silver crown was first coined in 1565. At the union of the kingdoms all the Scottish coins were called in and recoined at Edinburgh. In France the earliest coins are those of the Merovingian kings. In the 13th century gold coins were issued. In Italy appeared the gold florins of Florence, and in Germany coins of the emperors, the electors and the smaller princes. The coins of Spain began with the Gothic princes. The Hungarian began in the 11th century and the Russian in the 14th. The coinage of Norway and Sweden at first resembled the British type and afterward the German.

Oriental.— In India the first coins of the Hindu princes are of the 7th century. Iron coins were minted in China as early as 2454 B.C., and in 14 A.D. a new kind of iron money was coined. These pieces were called yik-tseu, meaning "bended round and surrounded with



Chinese Cash.

red," on account of the raised edge of the coin, which was made of red copper. An imperial mint was established, and the officers of the

Sanglin (Academy of Science) were appointed mint masters. The pieces of 5 tsu were then issued, remaining the principal money in circulation for 800 years. After this came a new issue. The coins were circular with a square hole in the centre, in accordance with the Chinese belief that the "heavens are round and the earth square." This coin was called "kai-guen-t'-ling-pao," remaining until the present day. Upon the obverse the inscription reads: "Current money of the newest beginning," and in the exergue the date of the year of the emperor's reign. The principal gold coin was called "kin," a pound of gold.

American Colonial Coinage.—The earliest American coins were executed in 1612, for the Virginia Company, at the Sommer Islands, now called Bermudas. The coin was of brass, and bore on the obverse the words, "Sommer islands," and a "hogge on one side, in memory of the abundance of hogges which were found on their first landing." On the reverse was a ship under sail, firing a gun. The earliest Colonial coins were made in Massachusetts in 1652, when a "mint howse" was established at Boston and coins of the value of threepence, sixpence, and twelvepence were struck. These

New England Sixpence.

coins were to be of the fineness of "new sterling English money," and every shilling was "to weigh a threepenny troy weight, and lesser pieces proportionately." They were soon after in circulation, but owing to the excessive plainness of their finish they were found to be greatly exposed to "washing and clipping." To remedy this, in the same year "henceforth both shillings and smaller pieces shall have a double ring on either side, with the inscription (Massachusetts) and a tree in the centre, on the one side, and New England and the date of the year on the other side." In 1662 a twopenny piece was added to the series. These coins are now known as the "pine tree shillings," etc. The Massachu-

Pine Tree Shilling.

setts mint existed about 34 years, but all the coins issued bear only the dates 1652 and 1662, the same dies being used probably throughout that period. In the reign of William and Mary copper coins were struck in England for New England and Carolina, having on the obverse an elephant, and the reverse respectively, "God preserve New England, 1694," and "God preserve Carolina and the lord proprietors, 1694." In Vermont a mint was established by legislative authority in 1785, in the town of Rupert, and copper cents were issued of the following description: obverse, a sun rising from behind hills and plow in the foreground — legend, Vermontensium Res Publica, 1786; reverse, a radiated eye surrounded by 13 stars — legend, Quarta Decima Stella. Connecticut followed the example of Vermont, and in the same year, 1785, authorized the establishment of a mint at New Haven, and copper coins were issued weighing six pennyweights, and having on the obverse a head with the words Auctori Connect.; reverse, a female figure holding an olive branch. New Jersey authorized a copper coinage in 1786. The coins were inscribed: obverse, a horse's head with a plow beneath — legend, Nova Cæsarea, 1786, etc.; reverse, a shield — legend, E Pluribus Unum. Various other coins and tokens were issued by the Colonies.

United States Coins.— In the first Constitution of the United States, which was submitted to the States about 1787 for their ratification, it is provided that Congress shall have power "To coin money, and regulate the value thereof." The first Congress which held its session in 1789 was so busy in carrying out the designs of the Constitution in the formation of a Federal Government, that little time or attention could be given to the subject of coinage. About this time a foreigner of the name of John Mitchell proposed to coin coppers for our government. The matter was referred to Mr. Jefferson, then secretary of state, who reported against it. On 15 April 1790, Congress instructed Alexander Hamilton, then secretary of the treasury, to prepare a plan for the establishment of a mint. A long report was made by Mr. Hamilton, in which he proposed the coinage of the following pieces: A gold piece equal in weight and value to 10 dollars; a gold piece equal to a tenth part of the former, this piece to be a dollar; a silver piece which shall also be a dollar; a silver piece which in weight and value shall be the tenth part of a dollar; a copper piece which shall be of the value of the hundredth part of a dollar; a copper piece which shall be half the value of the former. The report was sent to Congress in January 1791, and 2 April 1792 the law "Establishing a Mint and regulating the coins of the United States" was approved by President Washington. The officers to be employed as provided by the Act were, a Director, an Assayer, a Chief Coiner, an Engraver and a Treasurer. The Act also provided that the coins to be struck should be:

Gold.— The eagle, of 10 dollars, to weigh 270 grains; the half and quarter in proportion, all to be of 22 carats fineness.

Silver.— The dollar of 100 cents, to weigh 416 grains, the half, quarter, dime and half-dime to weigh in proportion, the fineness to be 1485 parts in 1654, or 892.4 thousands.

Copper.— The cent to weigh 264 grains and the half cent in proportion.

The President proceeded at once to carry out the provisions of the Act and Philadelphia was selected for the erection of the mint. The foundation stone of the mint was laid on 31 July 1792. In September the building was so far completed that some of the machinery was put in and on 11 September six pounds of copper was purchased at 1s. 3d. per pound. Three

NUMISMATICS.

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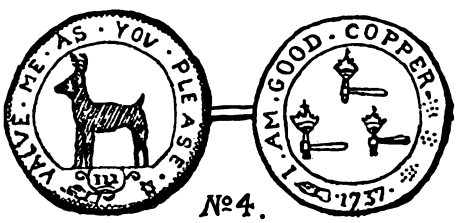

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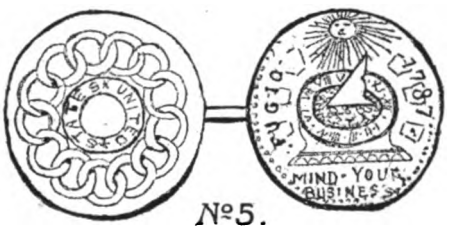

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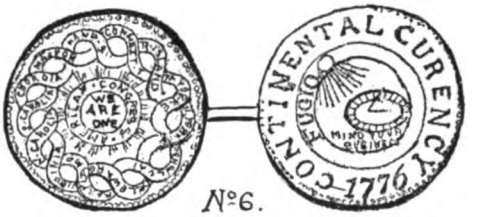

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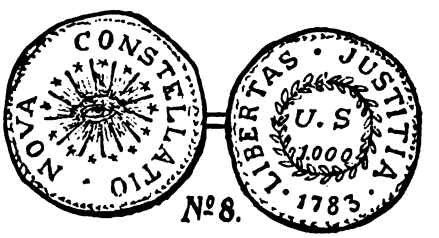

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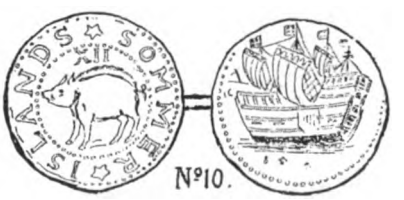

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AMERICAN COLONIAL COINS.

1. New Jersey Cent.
2. Vermont Cents.
3. Vermont Tokens.
4. The Granby Token.
5. The Fugio Cent.
6. Continental Coinage.
7. Carolina Tokens.
8. The Nova Constellatio.
9. Rosa Americana — Two Pence.
10. Sommer Island Brass Coin.

Mail

presses for coining which were imported arrived during September and in the beginning of October they were first used in striking half dimes. All of the pieces struck during this year were classed as pattern pieces, the regular coinage not beginning until the next year, when the Chief Coiner reported on 1 March that 11,178 cents had been struck. The first deposit of gold bullion received at the mint for coinage was in February 1795. Moses Brown, of Boston, Mass., made the deposit which consisted of ingots to the value of $2,276.22. The Chief Coiner reported the first return of gold coins on 31 July 1795. It consisted of 544 half eagles. Nine deliveries of this same coin were reported during the year. The first eagles delivered was on 22 Sept. 1795, the delivery consisting of 400 pieces. During the 19th century various experiments were made in the value of the American coins, and half cents, three-cent pieces, two-cent pieces and 20-cent pieces were issued and discontinued. In 1903, the coins in circulation were: dollars, half dollars, quarter dollars and ten-cent pieces of silver; five-cent pieces of nickel and silver alloy, and one cent in copper and bronze. See COIN; COINAGE; MINT; MEDAL; TOKENS.

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Editorial Staff, 'Encyclopedia Americana.'

Numitor, nū'mī-tôr. See ROMULUS.

Num'mulite, a genus of *Foraminifera,* mainly extinct, which forms vitreo-calcareous, many-chambered shells having much the form of a doubly convex lens, which when flattened by pressure as in fossil examples, led to their being likened to little coins (*nummuli*). They varied in size from that of a pinhead to that of a silver dollar. The group originated in the Carboniferous, increased, and flourished at its maximum during the early part of the Tertiary period, when these foraminifers swarmed in the seas in incredible abundance. Their shells constitute the bulk of the Eocene Nummulitic Sandstone of the Old World, where it is one of the most important, if not the principal formation of the Tertiary series of rocks, in point of extent. Attaining a thickness of many thousands of feet, it ranges from the Alps and Atlas to the Carpathian Mountains; appears in Egypt, Asia Minor, Persia, and can be traced through India and China into Japan. The pyramids of Egypt are built in greater part of this nummulitic limestone. Consult Geikie, 'Text-book of Geology' (1882), and the writings of Lyell, Prestwich and other geologists.

Nun. See MONASTICISM; SISTERHOODS.

Nun of Kenmare. See CUSACK, MARY FRANCES.

Nun of Kent. See BARTON, ELIZABETH.

Nunc Dimittis, nunk dĭ-mĭt'ĭs, the first two words of the Latin version of the Song of Simeon (Luke ii, 29, 33), 'Lord now lettest thou thy servant depart in peace,' etc. It was anciently used in the Vespers or Compline services of the Eastern and Western Churches, and is found in the Book of Common Prayer as part of the evening service.

Nuncio, nŭn'shĭ-ō, a papal commissioner who permanently represents the Pope abroad, and corresponds to the secular ambassador at a foreign court. A papal commissioner who is sent on a temporary mission is styled a legate and, if a cardinal, is styled a legate, *a latere,* that is, sent immediately from the side of the pontiff. Previously to the Council of Trent the papal nuncios acted as judges in the first instance of matters which lay within ecclesiastical jurisdiction; since that time they have been formed into a kind of court of appeal from the decisions of the respective bishops.

Nun'comar. See HASTINGS, WARREN.

Nuneaton, nŭn-ē'tŏn, England, a town of Warwickshire, on the Anker, 17 miles northeast of the town of Warwick. It has two churches, a free grammar and several other schools. Cotton and woolen manufacturing is carried on to some extent. By the amalgamation of Chilvers Coton, a suburb, in the last decade of the 19th century, the population increased from (1891) 11,580 to (1901) 24,995.

Nuñez, Pedro de Villavicencio, Spanish painter: b. Seville 1635; d. there 1700. He was of noble birth and early became a pupil of Murillo (q.v.) and one of the best Spanish painters of the Seville School which Murillo preeminently represented. At Malta, where he resided as one of the Knights of the Order of Saint John of Jerusalem, he studied under Mattia Preti (q.v.), called «Calabrese.» Returning to Seville he lived on the closest terms of intimacy with Murillo who expired in his arms. After the death of his great teacher he went to Madrid and there produced the picture, 'Beggar Boys Playing Dice,' which is altogether in the best style of Murillo. This work he presented to Charles II., king of Spain. 'Scenes from the Life of the Virgin' he executed for the Carmelite Convent at Seville, while his fine likeness of Archbishop Spinola at Seville gives a good idea of his power and style as a portrait painter.

Nuñez, noo'ñās, **Rafael,** Colombian statesman: b. Cartagena 28 Sept. 1825; d. there 18 Sept. 1894. After holding posts in the Colombian cabinet and consular service, he was elected governor of the state of Bolivar, and president of Colombia in 1879, 1883 and 1891. He was also a journalist, editing the 'Porvenir' in Colombia and 'El Continental' in New York, and published several volumes of prose and verse.

Nuñez de Arce, noo'ñāth dā ār'thā, **Don Gaspar,** Spanish poet: b. Valladolid 6 Aug. 1834. He studied at the University of Toledo, became a deputy in 1865, a member of the Academy in 1876, and minister for colonial affairs in 1882. Subsequently he became a senator and president of the Society of Spanish

writers. His lyric verse won for him the title of the "Tennyson of Spain." Among his works are 'Gritos del Combate' (5th ed. 1885), poems of the revolution; 'La Selva Oscura' (15th ed. 1886); 'La Vision de Fray Martin' (15th ed. 1886, on Martin Luther), translated into German by Fastenrath ('Luther im Spiegel Spanischer Poesie,' 2d ed. 1881); 'Ultima Lamentacion de Lord Byron' (23d ed. 1884); 'El Vertigo,' 25th ed. (1886); 'La Pesca' (15th ed. 1886); and 'Maruja' (9th ed. 1886).

Nuñez de Balboa. See BALBOA.

Núñez, Cabeza de Vaca, kä-bā'thä dā vä'kä, **Alvar,** Spanish explorer in America: b. Estremadura 1507; d. Seville 1564. In 1527 he sailed from Spain in the ill-fated expedition of Pánfilo de Narvaez for glory and plunder, but was captured by Indians and carried about by them in western Louisiana and eastern Texas. He was successful in trade, exchanging the shells and wampum of the coast for hides and other inland commodities. During his eight years' captivity he also gained considerable reputation as a sorcerer, and the reverence in which he was consequently held was undoubtedly an aid to his safety. He finally escaped, fell in with three other survivors of Narvaez' undertaking, ascended the Rio Grande, crossed Chihuahua and Sonora to the Gulf of California, and finally (May 1536) reached Culiacan. The pilgrimage was one of 2,000 miles, and involved every sort of vicissitude. One result of the journey was to reveal to Spanish knowledge a great territory north of Mexico and to lead to the strange quest for the seven cities of Cibola. A joint account of their travels, given by the travelers at Santo Domingo was printed in Oviedo's 'Historia General y Natural de Indias.' De Vaca was sent as administrator of La Plata in 1540, and was the earliest explorer of Paraguay. In 1544 he was arrested on the charge of Irala, a follower; sent to Spain; exiled to Africa; and in eight years pardoned. He published an account of his adventures in 1542. This appeared in an English version in 'Purchas his Pilgrimes' (1625); as well as in a translation by Smith (1857–71).

Nunivak, noo'nĭ-väk, Alaska, an island off the west coast, in the Bering Sea; separated from the mainland by the Etolin Strait, about 48 miles wide. It is about 55 miles long and 40 miles wide; area, about 1,200 square miles. It is fertile and well wooded on the west and south; the inhabitants are Eskimos. They have considerable trade in ivory, skins, and fish.

Nun's Priest's Tale, The, one of the stories in Chaucer's 'Canterbury Tales.' Its origin is a fable by Marie de France which was subsequently amplified in the 'Roman du Renart.' It relates the escape of Chanticleer from the jaws of the fox by inducing the latter to open his mouth for speech. Dryden modernizes the story in 'The Cock and the Fox.' In Æsop's Fables a similar narrative occurs.

Nu'phar, a genus of yellow water-lilies, order *Nymphæaceæ*. See WATER-LILY.

Nur-and-Spell, an old English game, peculiar to the rural districts, played with a ball, which is "risen" from a trap and hit with a bat made for the purpose. The ball, called the "nur," is made of wood, a little bigger than a walnut. The bat, called a "tripstick," as it is also used to spring the trap or "spell," consists of a piece of hard wood, 6 by 4 inches, and 1 inch thick (the pommel), attached to a supple handle from 3 to 4 feet long, which the player grasps with both hands, giving the full swing of his body with the stroke. The game consists of the cumulative distance of a given number of strokes, the player who has the greatest number of yards being the winner.

Nur-Ed-din El-Betruji, noor-ed-dēn' ĕl-bĕ-troo'jē, Arabian astronomer: b. Morocco, 12th century. He was known also by the name of Alpetragius and was an authority upon astronomy in his day. He disproved Ptolemy's theory of the epicycle. See 'Alpetragii Arabis Planet. Theoriæ phys. Rationibus Probata' (1531).

Nureddin-Mahmud, noo-rĕd-dēn' mā-mood', **Malek al-Adel,** sultan of Syria and Egypt, styled "Al Shahid," "the Martyr": b. Damascus 21 Feb. 1116; d. there 15 May 1174. He succeeded his father as emir of Aleppo in 1145 and repelled Jocelin de Courtenay's attack on Edessa. He held the armies of the second crusade (1147) at bay, and, after their departure, invaded Antioch and speedily wrested from the Christians all northern Syria, making Damascus his capital. The alliance of the Greeks and Franks against him came to nothing, and Nureddin extended his power to Egypt. But there his lieutenant Shirkoh was succeeded by the great Saladin (q.v.), who gradually made himself independent of his master. Nureddin was on his way to Egypt to punish Saladin when he died. He was highly praised by Christians and Mohammedans as a just, charitable and noble character.

Nuremberg, nū'rĕm-bĕrg, or **Nürnberg,** Germany, a city of Bavaria, in Middle Franconia, the second city in the kingdom, and once the greatest and most wealthy of all the free imperial cities of Germany, on the Pegnitz, 93 miles northwest of Munich. It is surrounded by an ancient wall flanked with towers and pierced with 10 gates, the whole enclosed by a dry ditch 100 feet wide and 50 feet deep; parts of these fortifications have been removed to make way for great extensions and improvements. The Pegnitz, traversing the town from east to west, divides it into two nearly equal parts—the north, or Sebalderseite, and the south, or Lorenzerseite, connected by numerous bridges. Notwithstanding modern improvements the city remains the quaintest and most interesting of Germany, owing to its many picturesque mediæval features. The Burg or royal palace, built (1024–1158) by Conrad II. and Frederick Barbarossa, commands a glorious view of the surrounding country, and is rich in paintings and wood-carvings. Among conspicuous public buildings the town-house, an Italian building of three stories, with a fine front, and a great hall, the walls of which are decorated with paintings in oil, many of them by Dürer. The Germanic National Museum, founded in 1852 in a suppressed Carthusian monastery, a Gothic building of the 14th century, with extensive cloisters, and since much extended by the addition of the rebuilt Augustinian monastery adjoining, now ranks among the first in Germany, and is exceedingly rich in works illustrative of the arts and industries of the Middle Ages. The most remarkable edifice is Saint Se-

bald's Church, which gives its name to the north division of the town, a Gothic structure of great elegance externally and internally (its older parts dating from the 10th century), containing the shrine of Saint Sebald, a tomb in bronze by Peter Vischer, who, with his five sons, labored upon it for 13 years, and adorned it with nearly 100 figures, among which those of the apostles are conspicuous for size and beauty. Other buildings deserving of notice are the church of Saint Lorenz, containing a remarkable pyx by Adam Kraft, exquisitely sculptured in white stone, 64 feet in height. There are several public fountains, the chief being the Schöne Brunnen, in the form of a graceful Gothic cross 63 feet high, adorned with figures. There are statues of Dürer, Hans Sachs, Melanchthon, and others. There is also a monument of the war with France, erected in 1876. The town library contains 80,000 volumes, and educational institutions are numerous. Communication between the various parts of the town and with the suburbs is facilitated by electric tramways. Before the passage to the East Indies round the Cape of Good Hope was discovered Nuremberg was the great mart of the produce of the East coming from Italy and going to the North. The manufactures are still considerable, and again rapidly rising in importance. Among the most important at the present day are toys, lead-pencils, colors, chemicals, clocks and watches, brass and steel wares, playing cards, tobacco and cigars, railway-carriages, machinery, electrical apparatus, musical and scientific instruments, beer, etc. The toys made here and in the neighborhood go to all parts of the world. Printing, lithographic work, type-founding, and book-binding are also extensively carried on. There are schools for the training of mechanics; and there is a large industrial museum. The town is celebrated, in connection with its industry, for the invention of watches, wheel-locks (used in discharging old muskets), gauge-plates for drawing brass-wire, clarinets, and air-guns.

Nuremberg, though an ancient city, does not carry its origin so far back as Roman times. It had acquired considerable importance by the 10th or 11th centuries, and was frequently visited by the emperors of Germany. It was greatly enlarged by Conrad III., and received several embellishments and important privileges from Frederick Barbarossa. In 1219 it was raised to the rank of a free city of the empire. It early took part in the Reformation. Subsequently it suffered during the great European wars, and being repeatedly laid under contribution by both parties, became so exhausted that the sources of its prosperity were almost dried up, and the population rapidly decreased by extensive emigration. Having finally incurred a load of debt, which made it an acquisition of little value to any state, it was formally taken possession of in 1806 by Bavaria, which undertook the settlement of its debts, and, by judicious arrangements, has considerably increased its trade. Many distinguished individuals have been born here, among them the poet Hans Sachs, the painter Albert Dürer (whose house may still be seen), and the sculptors Peter Vischer and Adam Kraft. Pop. (1900) 261,022.

Nur'hag, ancient round towers on the island of Sardinia. They are about 50 feet high and about 90 feet in diameter, measured at the base and outside of the platform on which the largest of them are founded. The materials are limestone, trachitic porphyry, granite, or volcanic rocks, obtained from neighboring quarries. Each block forms a cube about 3 feet each way, and its surface is an irregular line, such as the blows of the hammer in shaping it may be supposed to have made; the walls are without cement, within as well as without. A wall of 10 feet, built like the main structure, is surrounded by a parapet 3 feet high. The roof of each apartment is arched; the entrance terminates in a flat architrave, and is sometimes so high that a man can enter without stooping, and sometimes so small that he can only creep into it on his stomach, though it gets wider as he proceeds. Hence the low chambers are mere cells formed in the thickness of the wall, while the high chambers are supported by pillars. In the cells broken human bones mixed with earth, like that of ordinary graves, have been found. It is many centuries since these remarkable monuments attracted attention. The origin and aim of these structures is still, however, not free from doubt, though they are generally regarded as tombs, constructed so as to be available, in emergencies, for purposes of defense.

Nurse, Trained, is one who has followed a course of training in a school for nurses connected with large city hospitals, for two years or more, and who has received a diploma after a severe examination, and has been graduated. It was not until the early part of the 12th century that a so-called school for nurses was organized, by the Abbess Hildegarde, among her friends and associates for service in the hospitals. From this small beginning grew the system of a special training for nursing, which, however, remained in its infancy until the middle of the 19th century. In 1840 there was an organization of nurses in London which cared for the sick poor, but it remained for Florence Nightingale to give the impetus to a movement toward securing a more efficient training for nurses. This movement Miss Nightingale started in 1853. In 1870 Miss Louise Lee Schuyler, who was the founder of the New York State Charities Aid Association, organized the Bellevue Training School for Female Nurses in New York city, and in 1872 the first class of trained nurses in this country was graduated from Bellevue Hospital. Now nearly every large hospital in the country has its training school.

The term of study, in most of the schools, is two years. In some of the small towns the course may be one year or 18 months, and in some schools three years is required. Application is made to the superintendent of the training school, and after a physical examination, the applicant is received on a two months' probation term. During this period the applicants receive board and lodging, but serve without pay, and education, strength, powers of observation and endurance are tested. If, after this probation, they prove acceptable to the superintendent, they are required to sign an agreement for the balance of the term, whereby they bind themselves to obey the regulations of the hospital and remain in the school until the term is ended. This agreement can be terminated for cause by either party. Pupils reside in the "home" connected with the hospital, wear a uni-

form, while on duty, and receive board, lodging, laundry work and a small compensation, generally $10 or $12 a month. Lectures are given by the members of the staff of house physicians, the visiting physicians and surgeons, and head nurses. The lectures by the physicians cover anatomy, physiology, materia medica and all departments of medicine. The head nurses teach bandaging and the dressing of wounds. Obstetrics and the care of the insane are also taught. Massage is taught in a degree; but if a nurse wishes to take the full course, it requires a six month term in a regular massage school. A diet-kitchen, where proper food for the sick is prepared, is generally under the charge of one of the head nurses. The first three months are occupied by the pupils in a general observation of the work of the hospital ward's head nurse and the assistant nurse. The care of the beds of the patients is one of the first duties learned. Taking the pulse, temperature and respiration of a patient and making a record of it on a chart provided are the next steps. In the surgical wards the dressing of slight wounds is a part of the duties, and probably the pupil must assist in the care of the operating room and making ready the dressing to be used after operations have been performed. The pupil is then examined and, if the examination is satisfactory, advancement to assistant nurse follows. After three months more comes another examination, and at the end of a year, still another. The pupil then is a full fledged nurse and is placed in charge of a ward, and full responsibility for the condition of the patients is placed upon her. She must receive the new patients sent from the receiving ward, note their condition, and if she thinks it warranted, send for the house physician at once. Otherwise the patients wait until the regular call. She must go with the house physician, when he makes his visits to the bedside of each patient, carefully note his diagnosis of each case; make a memorandum of the medicines prescribed and see that the medicine is properly administered. She must note the least sign of change in the patient's condition, and, if for the worse, call the physician at once, or in extreme emergency, be ready to know what to do and do it at once. She must be extremely self-reliant and be ready to know how to act on the instant, as the life of the patient very often depends on quick action. After graduation she goes into private practice and must be prepared any hour, day or night, to respond to a call. The salary received varies from $25 to $50 a week, according to the severity of the case.

In December 1887, D. O. Mills of New York, after a visit to the city hospitals, decided that the number of infirm and sick men who were in the hospitals made it a necessity to educate male nurses, and he organized the Mills Training School for Male Nurses of Bellevue Hospital, put up a building on the Bellevue grounds and gave it to the City of New York to be used as a "Home" for the male training school. The first class of male nurses was graduated from Bellevue in 1890. The male training school idea was taken up by the physician in charge of the City Hospital, on Blackwell's Island, and the first class graduated from there in 1890, shortly after the Bellevue class. The training is the same as in the female schools, the only difference being that greater attention is bestowed upon diseases of men. When the male nurse begins private practice his salary ranges from $5 a day of 12 hours to $10; and, in contagious or infectious diseases, to even more.

State registration of trained nurses is now a law in New York, Virginia, North Carolina and New Jersey. The Legislatures of these States passed bills in 1903 requiring trained nurses to register their names and addresses with the county clerk of their respective counties. In the State of New York registered nurses are entitled to use the abbreviation "R. N." after their names, and it is made a misdemeanor punishable by fine for any person not a trained nurse to use the abbreviation. Nothing, however, contained in the acts is considered as conferring any authority to practise medicine or to undertake the treatment and cure of diseases. Examinations are held under a commission of five members of the New York State Nurses' Association, appointed by the Regents of the University of the State of New York. They grant certificates which may be revoked for sufficient cause, after written notice to the holder, and no person is allowed to practise as a registered nurse after such certificate has been revoked. The law in the other States is virtually the same as in New York. The best known training schools are those connected with the Bellevue, Presbyterian, Mount Sinai and City Hospital in New York city; the Massachusetts General Hospital, in Boston; Philadelphia and Pennsylvania Hospitals in Philadelphia; Johns Hopkins Hospital in Baltimore and the Illinois Training School for Nurses, Chicago. The first class of young negro women ever graduated as trained nurses was sent from the Lincoln Hospital and Home, New York city, in December 1903.

The buildings of the New York City Training School for Nurses, of the City Hospital, Blackwell's Island, were dedicated 3 Dec. 1903. There are three buildings; the first named "Jones Hall," as a tribute to the services of Mrs. Cadwalader Jones, who has been the chairman of the advisory board of the school since its organization in 1875, and its reorganization on more distinctively educational lines in 1888 was directly due to her efforts. The building is a four-story structure 35 by 107. The first story contains a class room, drawing room, and two rooms for the isolation of contagious cases of sickness among the nurses and their cure. Each of the other three stories contains rooms for the accommodation of 18 nurses. The second building is named "Rice Hall," in honor of Mrs. William B. Rice, who is a member of the advisory board of the City Training School and of the Board of Managers of the Bellevue Training School. This building contains, on the first floor, the offices of the school, the chemical and bacteriological laboratories and a room for the classes in dietetics. The other three stories contain rooms for 16 nurses. The central building was christened "Schuyler Hall," in honor of Miss Louise Lee Schuyler, the founder of the Bellevue Training School for Nurses, and contains the kitchen, dining room and rooms for 20 nurses.

FRED H. ADAMS,
Staff of the New York City News Association.

Nurse-frog, any of various frogs and tree-frogs which have or make special arrangements for the care of the eggs or young, or of both. The most widely known example is probably the European obstetrical frog (q.v.), the male of which takes charge of the eggs as soon as laid by the female, and carries them with him until they hatch. Many other species, especially among those living in the American tropics, take precautions as to their offspring. Thus one, the Brazilian ferreiro (*Hyla faber*) makes beneath the water in the ponds where it goes to spawn, small walled-in basins of mud, within which the spawn is deposited and the tadpoles are reared in safety from many enemies that would attack them were they running at large. Several kinds of frogs have their few eggs placed upon the back of the female, in pits or pouches in the skin, and keep them there until they hatch; and in one well known genus (*Phyllobates*) the tadpoles cling to the mother's back, and are carried about and cared for until able to transform and care for themselves. Consult Gadow, 'Amphibia and Reptiles' (1902). See FROG; MARSUPIAL FROG.

Nurse-shark, a name given by American fishermen to several different kinds of shark, as the Sleeper (*Somniosus microcephalus*), and especially a voracious tropical shark (*Gingly-mostoma cirratum*) abundant about the coral reefs of the West Indies and the coast of Mexico, where it is called *gata*. The Port Jackson shark (*Cestraciont*) is sometimes called nurse-shark.

Nursery, in agriculture, a place where shrubs and trees are raised for transplanting or for sale. In America the term excludes florists' establishments and other places where herbaceous plants are grown, being restricted to places where woody plants are progagated, the division resulting from the earlier development here of the orchard and other fruit interests, and from the different kinds of equipment required by the two branches. There is apparent a further division of the nursery business proper into establishments for growing (*a*) ornamental, and (*b*) useful plants. The commercial history of this industry is confined to the 19th century, paralleling and fostering the development of the fruit industry, and extending westward and southward from western New York which has long been the centre of the business, with headquarters at Rochester. According to the census statistics of 1900, the industry represents a capital investment of $52,500,000 in 4,500 nurseries, covering an acreage of 172,800 acres. To operate this area there were required 45,600 men, 2,279 women, 14,200 horses, mules, etc. Of the 3,400,000,000 plants grown 518,000,000 were fruit trees, of which 240,500,000 were of apple alone. Grape vines and small fruits aggregated 685,600,000. From other estimates it is concluded that in most species less than half of the plants grown in nurseries reach maturity; for instance, the census of apple trees in 1900 was 201,794,764, of which a large proportion are young trees not in bearing.

The great majority of trees raised in the fruit nurseries of America are for orchard planting and are trained erect; whereas in European nurseries they are trained in many forms, such as espaliers, dwarfs, standards, bushy forms, etc. Ornamental trees are largely grown from cuttings, layers, etc., fruit trees from scions, either by grafting or budding (see GRAFTAGE). The former method is preferred in the western States, first, because more than one tree may be obtained from one root used as stock, and second, because the long scion placed upon the foster stock will take root if placed far enough below the surface, a process which eliminates much of the uncertainty felt with respect to hardiness of trees upon nondescript stocks. In the East fruit trees are generally budded, since budding supplies whole roots in full activity at the time of performing the operation.

To supply the nurseries with stocks for the various fruit trees, specialists have arisen, particularly during the closing decade of the 19th century, and the nurseryman who raises his own stocks, except of peaches, is the exception. France supplies most of the pear and cherry stocks, and many stocks of other kinds; the prairie States furnish the great bulk of the apple stocks. The fruit tree nurseryman therefore confines his efforts largely to the propagation of the plants after budding or grafting. He is thus enabled to bend his energies to the production of large trees in restricted time, a process which is believed to exhaust the soil to such an extent that two crops of nursery trees are rarely grown upon the same land oftener than once in five years, during which time the land is devoted to clover or other crops which tend to improve the texture of the soil and the content of humus. Hence nurseries are likely to change their situations frequently and hence to occupy rented land. Ornamental and forest trees are believed to be less exhaustive and are thus more stable in their establishment. Commercial manures seem to be slower in bringing "treed" land into condition again than are stable manure and green crops.

Prior to the establishment of the agricultural experiment stations, nurseries exercised a profound influence upon the fruit industries throughout the country. Though they still play an important role they have a narrower scope, much of the variety-testing at present being conducted by the experiment stations. The leading nurseries are still looked to for much authoritative information, and they still seek to maintain and foster their business by honest and conservative methods and the sale of correctly named and healthy stock only.

Since the introduction of new fruits from abroad, or even from other localities in the United States, has been found to bring into action new insect and fungus enemies, State legislation has established inspectors of nursery stock. The most progressive nurserymen, accordingly, have adopted methods of control such as fumigation-houses. Badly infested stock is generally destroyed as the best means of preventing the spread of the pests to new, uninfested localities.

For the unification of interests and the improvement of methods the American Association of Nurserymen was formed, and a monthly magazine, 'The American Nurseryman,' is published at Rochester. Consult Bailey, 'The Nursery-Book' (1896).

Nursery for Children, Hygiene of the. There is no part of the home requiring more particular and intelligent care with respect to the conditions of health than that which is assigned to the children of a household. The

children's apartment should be a large, sunny, dry, and well-ventilated room. Absence of sunlight is as bad for children as plants — both grow pale and sickly in consequence of it. Excess of sunlight can be averted by blinds, awnings, or dark-colored (preferably green) window-shades. The room should be above the first floor, in a well-built house, on dry ground, and should have good plumbing. The furniture of a nursery should be comfortable, but simple and easily cleaned. The floor is best covered with a carpet or rug which can be readily removed for cleansing, or when a contagious illness prevails. The walls should be either painted (preferably a light gray), varnished, or covered with a varnished paper which can be washed. Dirt must be kept out of the nursery. There should be no heavy furniture. All cupboards and closets should be kept clean and well aired. There should be no "tuck-away" places. Dusting, as ordinarily carried out — that is, the transferring of dust from one place to another — should be unknown. Dust should be removed by hand, with a slightly moistened piece of cheese-cloth, and with the cloth fastened in a metal grasp fitted to the end of a pole made for that purpose. The floor should be swept after moistened tea leaves or sawdust have been sprinkled over it. The corners of the room should be rounded so that no dust can lodge in them.

Ventilation and Warming.—While a nursery should be always comfortably warm, it should be well aired or ventilated, and fresh air must come from out of doors. Few houses are equipped with such a good system of heating and ventilation that the opening of a window to admit air is not necessary. But cold air should not blow upon the child. In fact, in cold weather children should not be allowed to stay near a window, even if closed, as it is the cold air that comes through crevices that "cuts like a knife." As the current of cool air is greatest along the floor of a room, in cold weather children should not sit upon the floor. The room may be frequently ventilated by opening a window for a short time at the top, the children meanwhile being more warmly clad. Or the air may be admitted through an elbow tube, or through the space between the upper and lower sash, the lower sash being raised several inches and having under it, along its entire length, a board (window-board). A stout piece of cloth, decorated if desired, may be fastened across the lower part of the window, with the window raised nearly to the upper edge of the cloth, the air comes tempered through the cloth, and also between the upper and lower sash. The upper sash may be lowered a few inches, and a frame covered with one or more layers of cloth fitted in between the sash and the window-frame. As lamp and gas light readily pollute the air of a room, protected candles are better.

The temperature of a nursery should be from 65° to 70° F. Open fire-places, the Franklin and barrack stoves, or hot-water pipes are frequently better for heating purposes than close stoves or furnaces, which unduly dry the air. If close stoves are used they should have no dampers. All heating and lighting apparatus should be well protected, so that children cannot burn themselves or set fire to anything.

Nuisances and Sources of Contamination.—There should be no imperfect plumbing in the nursery — in fact, all plumbing would better be in an adjacent room. Soiled napkins and other offensive articles should be promptly removed from the nursery, also remnants of food. Toys should, so far as possible, be unpainted and clean. Disinfectants are rarely needed, except in cases of sickness, if sunlight, good air, and cleanliness are secured.

Toilet.—While a warm bath, with the occasional use of a pure soap and thorough drying, is necessary, the child should become accustomed to cool water. This can usually be accomplished by gentle sponging with cool water after the use of warm water. A child does not always need a daily bath. Soft towels or cloths are best for drying purposes. Toilet-powders need not be used except where the skin remains moistened. Much of the soreness upon the buttocks and in the groins can be prevented by the use of dry, soft napkins, washed in soft water and with a soap containing little alkali. The scalp and teeth should be kept clean, and only soft brushes employed. A comb should rarely be used.

Dress.—This should be sufficiently warm, and as small in amount as is consistent with comfort. The underclothing is of the most importance, and should be of woolen or linen mesh-work of varying degrees of thickness, depending on the seasons of the year. The fabric of children's clothing should be soft. Tight constriction by bands is injurious. When a child begins to use its limbs freely the clothing should be shortened. Shoes should be soft, and for young children without heels, and should not cramp the toes.

Food.—The child's food should be well cooked and clean; the milk should be pure; if there is any doubt as to its purity it should be sterilized. Long-tubed nursing-bottles should not be used. All receptacles of food should be kept clean. Boiling and straining the drinking-water is frequently advisable. It should be cooled by placing it in corked bottles in the refrigerator.

Nursery Lore and Nursery Rhymes are songs and jingles for children handed down from past generations. These folk-lore jingles are mechanically repeated in the play-room and on the play-ground, the children having little if any knowledge of the significance or origin of the rhymes. Being in verse form they are easily preserved, either as mere traditional rhymes, or as formulas to be used in games; and, as unconscious survivals of a remote antiquity, they not infrequently preserve for the scientific inquirer fragments of ancient incantations for healing diseases or revealing the future, and invocations combined with ceremonial observances, while the intimate nature of the religious conceptions involved points back unmistakably to a mediæval origin. Children with all their inventiveness and imagination are slaves of the letter, and most of their game-formulas are handed down from generation to generation along with the games themselves. In their characteristic directness, point, and quaintness of phrase, they defy imitation, and in their faculty of arresting the imagination from age to age they reveal the instinct of perpetuity. Many of them are beyond doubt survivals among children of May games,

ring-songs and dances, rounds, and kissing games which in old England were played by grown-up people, and these of the higher grades of society. Many of these are still current in America which are now forgotten in the mother-country, although they not infrequently have equivalents on the continent of Europe. Under the same general head are included nursery rhymes proper, and counting-out rhymes, cumulative rhymes, courting and love games, playing at work, flower oracles, and riddle and guessing games; while on the other hand popular mottoes, old saws and maxims relating to husbandry, the weather, or the like, and all the wealth of local rhymes and sayings belong to the popular rhymes of folk-lore generally. The verses usually consist either of a rhyming couplet, or of four lines in which the second and fourth rhyme; they are often accompanied by a refrain, which may be a single added line, or may be made up of two lines inserted into the stanza; and in place of exact consonance, any assonance, or similarity of sound, will answer for the rhyme.

Upon the subject of nursery rhymes upward of 70 volumes have been published and none of these are more authentic than 'The Games and Songs of American Children' by W. W. Newell, published in 1884. Other works are: Chambers, 'Popular Rhymes of Scotland' (1842); Halliwell, 'Nursery Rhymes of England' (1860). See also FOLK-LORE; PROVERBS; RIDDLES.

Nus, Eugène, ė-zhān nüs, French dramatist: b. Châlons-sur-Saône, France, 1816; d. 1894. He was an ardent Socialist, and his first success as a dramatist was with his 'Jacques le Corsaire' (1844). Among his works are: 'L'Enseignement mutuel' (1846); 'Choses de l'autre Monde' (1880); 'Vivisection du Catholicisme' (1894); etc.

Nusku, noos'koo, in Assyrian mythology, a solar deity who afterward became a fire god. He was regarded as a messenger of the gods.

Nussbaum, noos'bowm, **Johann Nepomuk,** German surgeon: b. Munich, Bavaria, 2 Sept. 1829; d. there 31 Oct. 1890. He studied in Munich, Würzburg, Berlin, and Paris, and in 1860 became a professor at the University of Munich. He published: 'Die Pathologie und Therapie der Ankylosen' (1862); 'Die Verletzungen des Unterleibs' (1880); 'Ueber Chloroformwirkung' (1885); etc.

Nût, noot, in Egyptian mythology, the goddess of the sky, wife of Keb, the god of earth.

Nut, a piece of metal tapped, and adapted to be screwed on the end of a butt. It is used for many purposes, but especially on the end of a screw-bolt, in order to keep it firmly in its place.

Nut Brown Maid, The, an old English ballad, the earliest extant form of which is found in Arnolde's 'Chronicle' (1502). It is based on the legendary story of Henry Clifford, known as "The Shepherd Lord." Consult Percy, 'Reliques,' series 2, book i., 6.

Nut-gall, a hard, nut-like gall (q.v.), especially those from the Asiatic oaks, used in ink-making and for other purposes. The Chinese and Japanese nut-galls of commerce, however, are from species of *Rhus,* and are large and very irregular in form. They contain from 30 to 60 per cent of tannin, and are the source of gallic acid ($C_7H_6O_5H_2O$) which appears in white silky needles, soluble in alcohol, less so in ether, and sparingly soluble in cold water; it is precipitated blue-black by ferric salts, the color disappearing on boiling, and is not affected by gelatine, except in the presence of gum. Consult Maisch, 'Materia Medica' (2d ed. 1885).

Nut-grass, or **Chufa,** a sedge of the genus *Cyperus,* especially *C. esculentus,* of the Eastern and Southern States, whose root-stocks bear small tubers, like nuts, which are edible to man, and of good flavor when roasted; and which are highly nutritious to hogs who eagerly search for them. Consequently these sedges are planted in some parts of the country as a food-crop for swine. An oil may be expressed from these tubers, or "ground-almonds," which is an excellent substitute for olive-oil for table use.

Nut-lock, a means for fastening a bolt-nut in place preventing its becoming loose by the jarring or tremulous motion of the machinery. Such are used upon fish-plates of railways, upon harvesters, etc.

Nut-weevil, a snout-beetle of the genus *Balaninus,* which deposits an egg in the kernel of a nut, when it is young, where the egg hatches and the grub feeds until the kernel is destroyed, when it bores its way out through the shell. Several species infest the various commercial nuts.

Nuta'tion, a term used in astronomy. The motion of the earth on its axis is one of "precessional rotation." On a celestial globe the axis of the earth describes a curve round the pole of the ecliptic, because of its precession. Superimposed on this motion of the axis is its nutation, which, if existing alone, would cause the axis to describe an ellipse every 19 years on the celestial globe, its major axis being directed to the pole of the ecliptic. The effect of nutation is to cause a wavy line to be described by the axis round the pole of the ecliptic. Precession causes the nodes of the earth's equator to describe a revolution in 25,866 years; nutation causes the nodes to move 6.87″ alternately in advance and behind the mean position due to precession. Bradley discovered and explained nutation not long after his discovery of the aberration of the fixed stars.

Nut'cracker, the English name of a species of crow (*Mucifraga caryocatactes*) found ranging over a wide area in the pine forests of northern and sub-Alpine Europe and Asia. It is dull brown, thickly speckled with white spots, and is about the size of a jay. The nutcracker is gregarious, wandering in bands of 50 or 100 in the autumn, but scattering to remote regions and becoming silent during the breeding season. Its chief food is nuts and seeds of conifers. It is said to hold nuts and cones with its foot and to extract the kernels by repeated blows of the bill.

A closely related American bird is Clark's crow (*Picicorvus columbianus*), discovered by the Lewis and Clark expedition in 1804–6. It is about one foot long, of a generally gray color, the wings and tail black with large white areas. It inhabits the coniferous belt of the Rocky Mountain slopes and congregates in great flocks,

which rove in search of food. The well-concealed nest is built in the tops of pine trees in the higher mountain ranges. Consult Coues, 'Birds of the Northwest' (1874).

Nut'hatches, small passerine birds forming the family *Sittidæ*, related to the titmice, from which, and from the creepers, they are readily distinguished by the long, straight, slender bill. The typical genus (*Sitta*), with about 15 species, is confined to North America, Europe and Asia, but some related genera are found in the Southern hemisphere. In the United States we have four species and several sub-species. The common resident eastern species (*S. carolinensis*) is nearly six inches long and has the under parts white. The red-bellied nuthatch (*S. canadensis*) is an inch shorter, with the under parts rusty brown and the glossy black cap cut by a pure white stripe on each side. This is a migrant species, which breeds in the northern States and Canada and on mountain tops, but in winter extends its range to the Gulf coast. Two still smaller species, the brown-headed nuthatch (*S. pusilla*) and the pigmy nuthatch (*S. pygmæa*), are respectively southern, and far western. Both have the crown brown, not black, as in the other two species, and *S. pygmæa* may be distinguished by the black and white markings on the middle tail-feathers, which are plain in *S. pusilla*. The habits of all are similar. They spend their time in traveling restlessly up and down the trunks and limbs of trees in the most nimble manner, hanging in any attitude supported by their strong, large feet alone and without the assistance of the tail. Consequently they display greater freedom of movement than either the woodpeckers or the creepers. Their food consists chiefly of insects and their eggs. In the autumn and winter they have the habit of wedging acorns and nuts firmly in crevices, and hacking them with the bill till they break open: this is done partly for the kernels and partly for the grubs which they frequently contain. From this habit the common name is derived. Their only note is a hoarse call. They nest in holes in trees, often in crevices beneath bark, and lay four to eight speckled eggs.

Nutmeg, the hard kernel of the fruit of various species of *Myristica,* especially *M. fragrans* or *moschata,* of the order *Myristicaceæ*. The common nutmeg-tree grows about 25 feet high, bears oblong, entire leaves, axillary racemes of small flowers, followed by golden yellow pear-shaped fruits which split in halves, exposing the kernel surrounded by a false aril which forms the mace (q.v.) of commerce. The fleshy halves of the fruit are used as preserves in countries where the trees are cultivated. Various species are cultivated in the tropics, particularly the East Indies, West Indies, Brazil, and Spice Islands. They are among the most important spices as which they are chiefly used. A fatty oil called oil of mace is expressed from the seed, and a nearly colorless essential oil is obtained by distillation. The tree thrives in the West Indies up to elevations of 2,000 feet, but is less productive there than at lower altitudes. It does best in well drained, rich loam, in warm, protected valleys.

Nutmeg-bird, a name among bird-dealers for an East Indian mina (*Munia undulata*), also known as cowry-bird; it is brown, with white streaks above and spots below, a yellow rump, and a white middle to the under parts. An eastern fruit pigeon (genus *Myristicivora*) is also so called, because it feeds upon the nutmeg fruit.

Nutmeg Melon. See Melons.

Nutmeg State, a popular name for the State of Connecticut, derived from the alleged ingenuity of Yankee inventors who were facetiously charged with manufacturing wooden nutmegs to be sold as genuine.

Nu'tria. See Coypu.

Nutrition of Farm Animals, The. The common domestic animals are fed for a variety of purposes. With cattle, sheep, and pigs, it is the object to induce gains in weight, that is, to fatten them, or in the case of milch cows, to produce gains in the form of body secretion, —milk, rather than fat on the body. In a similar way, sheep are fed for the production of wool; goats for milk or their fleece, and poultry, for the market and the production of eggs. Cattle are sometimes, and horses are almost universally, fed as beasts of burden. Animals with young require food for their development and after birth the young animal needs it for growth and the development of the body as well as for maintenance.

A great deal of information regarding food requirements has accumulated from the experience of countless generations, and for many years the problem has been studied experimentally at agricultural colleges, experiment stations, and similar institutions, in this and other countries. It is fair to say, at the present time, that the feeding of farm animals rests upon quite well defined general principles, derived from the studies of the chemist and the animal physiologist, concerning the composition and functions of food and the way it is utilized after it is eaten. Such studies show that the materials composing the body are constantly breaking down and being consumed, and that to keep the animal in a healthy and vigorous condition requires a constant supply of new material; if this is lacking or is insufficient, hunger, and finally death, result. To supply the needed materials is one of the chief functions of food, but in addition to this it maintains body temperature and also furnishes the force or energy which enables the animal to do work, and to perform the necessary functions of the body, such as keeping up the beating of the heart, the respiratory movements, and so on. Since it furnishes heat and energy, the food may be said to serve as fuel. If, in addition to maintaining the system, growth is made, as in case of a young animal, or milk is secreted, more food is needed than for maintenance. If the supply is in excess of all demands, some is stored as a reserve material, principally in the form of fat. To supply food in the right proportions to meet the various requirements, without waste, constitutes scientific feeding. By carefully studying the composition of feeding stuffs, the proportion in which they are digested and the requirements of different animals when at rest, at work, producing wool, giving milk, etc., the principles of feeding have been deduced. In applying these in practice, the cost and special adaptations of different feeding stuffs must also be taken into account.

The animal body and the different feeding stuffs which nourish it are all made up of a comparatively few chemical compounds, namely water, ash or mineral matter, and the so-called nutrients, protein, fats and carbohydrates, the carbohydrates being subdivided into two groups, namely, "nitrogen free extract," that is, sugars, starches, etc., and "crude fibre." Of these protein is the only nutrient which contains nitrogen, the characteristic element of body tissue, and is therefore the only one which can truly serve for building and repairing the animal body. Fats and carbohydrates serve as fuel and yield energy in the forms of heat and muscular power. Protein may also serve as a source of energy and thus has a two-fold function.

Water.— Water, though not a nutrient, is essential, being needed to dilute the blood and for other physiological purposes. All animals also require oxygen of the air for maintaining the life processes. Water constitutes from 40 to 60 per cent and ash from 2 to 5 per cent of the body; fat varies greatly with the condition of the animal, but seldom falls below 6 or rises above 30 per cent. The dry matter of the flesh, skin, bones, muscles, internal organs, brain, and nerves, in short, all the working machinery of the body, is composed quite largely of protein. (See NUTRITION OF MAN for more extended discussion of nutrients.)

Character of Food.— The feeding stuffs of most importance for farm animals are of vegetable origin, and include cereal grains, such as oats and corn, either ground or unground; leguminous seeds, as beans, peas and cowpeas; oil cakes and other commercial by-products, as linseed oil cake, cotton-seed meal, gluten feed, and so on; fodder crops, fresh and cured; and the different roots, tubers and green vegetables. In quite recent times, cane molasses, beet molasses, and other beet sugar by-products have also assumed more or less importance in this connection. As regards feeding stuffs of animal origin, milk is the natural food of the young of all mammals. After weaning, skim milk is a common food, especially for pigs. Dried blood, meat meal, and similar feeds of animal origin are also sometimes fed. The composition of a number of the more important feeding stuffs may be seen by reference to the subjoined table, which shows the average composition as determined by analysis and also the digestible nutrients furnished by each 100 pounds of the feeding stuffs.

TABLE I.— AVERAGE COMPOSITION OF A NUMBER OF FEEDING STUFFS.

KIND OF FEED	Percentage composition						Digestible materials in 100 pounds			Energy in 100 lbs. digestible nutrients
	Water	Protein	Fat	Nitrogen free extract	Crude fiber	Ash	Protein	Fat	Carbo-hydrates	
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	lbs.	lbs.	lbs.	Calories
Corn fodder	79.3	1.8	0.5	12.2	5.0	1.2	1.10	0.37	12.08	26,080
Kafir corn fodder	73.9	2.3	.7	15.1	6.9	2.0	.87	.43	13.80	29,100
Oat fodder	62.2	3.4	1.4	19.3	11.2	2.5	2.44	.97	17.99	42,090
Meadow fescue	69.9	2.4	.8	14.3	10.8	1.8	1.49	.42	16.78	34,760
Timothy	61.6	3.1	1.2	20.2	11.8	2.1	2.01	.64	21.22	45,910
Ky. blue grass	65.1	4.1	1.3	17.6	9.1	2.8	2.66	.69	17.78	40,930
Red clover	70.8	4.4	1.1	13.5	8.1	2.1	3.07	.69	14.82	36,190
Alfalfa	71.8	4.8	1.0	12.3	7.4	2.7	3.89	.41	11.20	29,800
Cowpea forage	83.6	2.4	.4	7.1	4.8	1.7	1.68	.25	8.08	19,210
Corn silage	74.4	2.2	1.1	15.0	5.8	1.5	1.21	.88	14.56	33,050
Corn fodder, field cured	42.2	4.5	1.6	34.7	14.3	2.7	2.34	1.15	32.34	69,360
Oat hay	16.0	7.4	2.7	40.6	27.2	6.1	4.07	1.67	33.35	76,650
Timothy hay	13.2	5.9	2.5	45.0	29.0	4.4	2.89	1.43	43.72	92,730
Hay from mixed grasses	15.3	7.4	2.5	42.1	27.2	5.5	4.22	1.33	43.26	93,930
Red clover hay	15.3	12.3	3.3	38.1	24.8	6.2	7.36	1.81	38.15	92,320
Alfalfa hay	8.4	14.3	2.2	42.7	25.0	7.4	10.58	1.38	37.33	94,940
Cowpea hay	10.7	16.6	2.9	42.2	20.1	7.5	10.79	1.51	38.40	97,870
Mangel-wurzels	91.2	1.4	.2	5.4	0.8	1.0	1.03	.11	5.65	12,890
Turnips	90.6	1.3	.2	5.9	1.2	.8	.81	.11	6.46	13,990
Corn, unground	10.9	10.5	5.4	69.6	2.1	1.5	7.14	4.97	66.12	157,220
Oats	11.0	11.8	5.0	59.7	9.5	3.0	9.25	4.18	48.34	124,760
Wheat	10.5	11.9	2.1	71.9	1.8	1.8	10.23	1.68	69.21	154,850
Cowpeas	14.8	20.8	1.4	55.7	4.1	3.2	18.30	1.10	54.20	139,490
Corn meal	15.0	9.2	3.8	68.9	1.9	1.4	6.26	3.50	65.26	147,800
Gluten meal	8.6	30.0	8.8	49.2	2.6	.8	21.56	11.87	43.02	170,210
Gluten feed	7.8	23.4	8.3	53.2	6.2	1.1	19.95	5.35	54.22	160,530
Brewers' grains, dried	8.0	24.1	6.7	44.8	13.0	3.4	19.04	6.03	31.79	119,990
Wheat bran	11.9	15.4	4.0	53.9	9.0	5.8	12.01	2.87	41.23	111,140
Wheat middlings	12.1	15.6	4.0	60.4	4.6	3.3	12.79	3.40	53.15	137,000
Cotton-seed meal	8.2	42.3	13.1	23.6	5.6	7.2	37.01	12.58	16.52	152,650
Cotton-seed hulls	11.1	4.2	2.2	33.4	46.3	2.8	1.05	1.89	32.21	69,840
Linseed meal, new process	9.9	35.9	3.0	36.8	8.8	5.6	30.59	2.90	38.72	141,160
Sugar-beet pulp, fresh	89.9	1.0	0.2	6.3	2.2	0.4	0.63	....	7.12	14,420
Sugar-beet pulp, dry	6.4	10.8	1.3	58.4	19.8	3.3	6.80	....	65.49	134,460
Beet-sugar molasses	25.7	a7.3	....	b58.2	....	8.8	7.30	....	58.20	259,180
Cane-sugar molasses	25.1	a2.4	....	b69.3	....	3.2	3.20	....	69.30	298,400
Whole milk	87.2	3.6	3.7	4.9	....	0.7	3.48	3.70	4.77	30,870
Skim milk	90.6	3.2	0.3	5.2	....	0.7	2.94	0.29	5.24	16,439

a Largely non-albuminoid nitrogenous materials. *b* Very largely sugars.

It will be seen that the cereal grains resemble one another quite closely in composition, being characterized by a fairly low water content and a considerable amount of protein and nitrogen-free extract. Some crude fibre derived largely from the outer or bran layer of the grain is also present. Bran, shorts, middlings, and other by-products and cereal grains vary in composition, but all have a low water content while the crude fibre content is rather high, and the nutritive ingredients are principally protein and carbohydrates. The large proportion of crude fibre is due to the fact that these products represent the outer layers of the grain which are more hard and firm in structure than the interior portion which consists quite largely of starch. Beans, peas, and leguminous seeds resemble the cereal grains in having a low water content, though in general they furnish a higher percentage of protein. Such foods are known to be useful and valuable, but with the possible exception of cowpeas, they are not very commonly fed in the United States, although much used in Europe.

Concentrated Feeds.— The various cakes, gluten meals, and similar feeding stuffs are, generally speaking, commercial by-products. Thus, cotton-seed cake is the material left after the oil has been expressed from the cotton-seed. In the same way linseed cake is the residue obtained from flaxseed in the manufacture of linseed oil. When this is ground it becomes linseed meal. In the manufacture of beer the malted grain remaining is known as brewers' grains, and is best fed after drying. When starch is manufactured from corn, the nitrogenous portion of the grain is rejected and constitutes gluten feed and gluten meal. There are a number of mixed feeds on the market which are made up of shrunken grains, branny material, and other residues obtained in the manufacture of cereal breakfast foods, etc. These vary in feeding value, some of them comparing favorably with more common cereal feeds. Grain, ground and unground, commercial by-products, leguminous seeds, oil cakes and similar products are very frequently called concentrated feeds, the name being suggested by the fact that their feeding value, especially the protein content, is high in comparison with the bulk. So far as the general experience and the result of American and foreign experiments go, most of the common feeding stuffs in the group are wholesome and valuable. Some are more prized than others for a particular purpose. Thus, oats are a favorite food for horses, especially in the Eastern United States, and other regions where they are a staple crop, but in the South and Middle West, corn is the most important feed. For fattening cattle, sheep and hogs, corn is undoubtedly the most important grain in the United States.

Forage Crops.— The various forage crops — grass, clover, Kafir corn, corn, etc., all have a high water content when fresh, that is, they are more or less succulent and juicy. They contain, however, considerable nutritive material, chiefly protein and carbohydrates, and are valuable feeding stuffs. The leguminous forage crops — alfalfa, clover, cowpeas, soy beans, vetch, etc.— are richer in protein than the grasses. When forage crops are dried and cured the resulting hay is richer in proportion to its bulk than the green material; in other words, it has been concentrated by the evaporation of the greater part of the water present. However, this is not the only change which has taken place. When hay is properly cured, it undergoes a peculiar sort of fermentation or oxidation materially affecting its composition, improving the hay by diminishing the quantity of crude fibre, and by increasing the relative amount of other nutrients, especially nitrogen-free extract. Hay which has undergone proper curing has a better flavor and agrees better with animals and is apparently more digestible than hay which has dried quickly in the sun without fermentation.

The feeding value of different forage crops, fresh and cured, depends in considerable degree upon the stage of growth, the nutritive value of the crop, generally speaking, increasing until the growth is complete and diminishing somewhat as the plants mature or become overripe. Straw, the fully ripened stalk of cereal grains contains some nutritive material, but is less nutritious than the same portion of the plant cut before ripening. In the perfectly ripe condition the nutritive material, elaborated in different portions of the ordinary forage plants, has been largely conveyed to the seed and used for its development or stored as reserve material.

Silage.— Green forage crops are frequently preserved by ensiling. In this process the material undergoes a peculiar oxidation which correspondingly changes it in composition and food value. Some of the carbohydrates are changed into alcohol, acetic and other acids, and crude fibre is undoubtedly softened somewhat and possibly the silage is thus rendered more digestible. Bodies having peculiar flavor and odor are also formed. The green crops, hay, straw and other cured crops and silage are frequently called «coarse fodder» or «roughage.» This term is due to the fact that they contain a comparatively small amount of nutritive material and a high proportion of crude fibre as compared with their total bulk. Although inferior to concentrated feeds in composition, they are an essential part of the ration of farm animals, serving to give the required bulk to the food and being useful in other ways. It is believed that unless the food when taken into the stomach is comparatively bulky and the mass is more or less loose in structure, it is not readily acted on by the digestive juices.

The outcome of many experiments made with farm animals is in accord with the observation of careful feeders, namely: that the various common coarse fodders may be fed very largely as circumstances demand. Although timothy hay is regarded, in some regions, and corn fodder in others, as the best coarse feed, yet, experience has shown that both these feeds, and also hays from wheat, barley and other cereal grains, and from clover and alfalfa, are all of great value. Fresh herbage was, of course, the original food of domestic animals, and in early times, natural pasturage was almost entirely depended upon to support them during a considerable part of the year. The importance of pasturage is still conceded, but the fact is also recognized that if, owing to drought or other cause, the supply is insufficient, other food will be needed. When green feed is cut and fed fresh to farm animals, more or less confined, the practice is called «soiling,» and is becoming quite prevalent, especially in older countries

where land is expensive. It is coming into use in some localities of the Eastern United States to such an extent as to entitle it to recognition as one of the systems of feeding. Partial soiling is much more common, being relied upon to carry animals through the period when pastures are short. Under the soiling system, a larger number of animals can be kept upon a given acreage, and by allowing open air exercise in a large yard or pasture, the practice has been demonstrated as entirely feasible for dairying animals. On an average, carrots, Swedish turnips or rutabagas, and other roots and tubers, green vegetables, and fruits contain a high percentage of water and small amounts of the different classes of nutrients. The percentage of crude fibre is smaller than in the green forage crops; but since the proportion of nutritive material is small in comparison with the total bulk, they are ordinarily referred to as coarse fodder. The establishment of beet-sugar factories in this country has led to the production of immense quantities of sugar-beet pulp as a waste material, sometimes called "diffusion residue," or "beet chips," which consist of the residue of the beet after the extraction of the sugar under pressure in the diffusion batteries. Sugar-beet molasses is another product of the beet-sugar manufacture, which accumulates in large quantities, and both this and cane molasses are coming to be regarded as an important feed. It owes its value largely to the sugar in it.

Preparing Feed.—It is often claimed that cooking feed increases its palatability and digestibility. The general opinion drawn from experiments with farm animals is that this belief is not warranted and that the cost of cooking is not made up for by the increased value of the ration. Soaking feed, especially hard grain, renders it more easily masticated, and possibly increases its digestibility, but the general conclusion is that the importance of soaking feed for most farm animals is overestimated, although soaking wheat for pigs is quite generally recommended. Sprinkling or wetting dry hay lays the dust and is a practice often resorted to, particularly for horses, as the dust from dry hay, especially clover, is believed to cause heaves. Opinions differ as regards the advantages of grinding grain, but from the results obtained in a large number of tests with farm animals, it does not appear that the superiority of ground over unground grain is sufficient to pay for the cost of grinding, provided the animals have good teeth and sufficient time to chew their food thoroughly. Chaffed or chopped coarse fodder occupies less space for storage than uncut hay or straw and can be readily handled. Shredding corn fodder is an economical practice, and more of the stalks and harder portions will be eaten than when fed whole, but for most farm animals in general, the practice of cutting or chopping coarse fodder is much less followed in the United States than in Europe. Precaution should always be taken to avoid feeding stuffs which are harmful in themselves or which become harmful. Dirt, small stones, etc., should be removed from grain by proper screening and all feeding stuffs should be clean. Moldy feeds and those which are more or less decomposed are unwholesome, and may prove a cause of various diseases. Plants which are infested with ergot are also harmful. There are a number of plants which are poisonous to stock, such as rattlebox . (*Crotalaria sagittalis*), larkspur (*Delphinium* sps.), death camass (*Zygaddenus venenosus*), water hemlock (*Cicuta* sp.), etc., and care should be taken to prevent animals from securing them. An explanation of the poisoning of stock by young sorghum and other green plants ordinarily wholesome, is offered by the discovery of a peculiar glucosid, which with the aid of a special ferment, also present in the plants, liberates prussic acid. This is doubtless always present in at least minute traces, but apparently becomes dangerous when the plant is arrested in dry weather at certain stages of its growth. Sunlight such as prevails in the arid and semi-arid regions of the United States sometimes causes the development of the poison in excess.

Digestibility of Feeds.—The real value of any feeding stuff is determined not alone by its composition, but also by its digestibility; that is, by the amount of material which it gives up to the body in its passage through the digestive tract. It is evident that if two feeding stuffs have practically the same composition, but one gives up more material to the body than the other—that is, is more thoroughly digested—it must actually be more valuable than the other material. The bulk of the substance of almost all feeding stuffs is insoluble when eaten. Only material in solution can pass through the walls of the stomach and intestines into the circulation and be utilized by the body; therefore, digestibility consists chiefly in rendering insoluble materials soluble. This is effected by the aid of digestive ferments and also to a less extent by bacteria. The usual method of ascertaining the digestibility of a given material is to feed it for a longer or shorter time, the amount and composition being determined. From the total nutrients consumed, the amounts excreted undigested in the fæces are deducted, showing the amount of each retained in the body. It is the usual custom to express the amounts digested in percentages, the results thus obtained being termed coefficients of digestibility. As regards the results of digestion experiments with farm animals as a whole, it may be said that the percentage of protein digested is fairly high, being greater in grains and seeds than in hay or grasses. Generally speaking, the value obtained for the digestibility of fat is rather low, but there are reasons connected with the analytical methods commonly followed which render the results obtained with fat not altogether satisfactory. Nitrogen-free extract is quite thoroughly digested by farm animals, but crude fibre is not very thoroughly assimilated. Farm animals differ considerably as regards the thoroughness with which they digest their foods. It seems fair to say that in general, ruminants digest a larger percentage of fats, carbohydrates, including crude fibre, than horses, the difference being most marked in the case of the crude fibre. Pigs ordinarily digest their food quite thoroughly. These results are in accord with what might be expected from differences in the digestive organs of the different classes or animals.

Food Requirements.—Attempts have been made to ascertain the food requirements of various kinds of farm animals under different conditions, and large numbers of feeding experiments have been made under varying conditions with this end in view. From the results feeding standards have been deduced which show

the amounts of digestible protein fat, and carbohydrates, supposed to be best adapted to different animals when kept for different purposes.

The feeding standards prepared by Wolff, a German investigator in animal nutrition, have been the most widely used of any. Wolff's standards have recently been modified by Prof. E. Lehmann, as the result of additional experiments and practical experience, and also in the attempt to adapt them more closely to the practical needs of the animal. A number of these standards are as follows:

TABLE II.—WOLFF-LEHMANN FEEDING STANDARDS.
(Amounts of nutrients required per day per 1,000 pounds live weight.)

Animal.	Total Dry Matter	Digestible Nutrients			Fuel Value
		Protein	Carbohydrates	Fat	
	Pounds	Pounds	Pounds	Pounds	Calories
Oxen at medium work	25	2.0	11.5	0.5	27,200
Oxen at heavy work	28	2.8	13.0	0.8	32,760
Fattening cattle:					
First period	30	2.5	15.0	0.5	34,650
Second period	30	3.0	14.5	0.7	35,500
Third period	26	2.7	15.0	0.7	35,900
Milch cows:					
Giving 11 lbs. milk per day	25	1.6	10.0	0.3	22,850
Giving 16.5 lbs. milk per day	27	2.0	11.0	0.4	25,850
Giving 27.5 lbs. milk per day	32	3.3	13.0	0.8	33,700
Fattening sheep:					
First period	30	3.0	15.0	0.5	35,600
Second period	28	3.5	14.5	0.6	36,000
Horses:					
Light work	20	1.5	9.5	0.4	22,150
Medium work	24	2.0	11.0	0.6	26,700
Heavy work	26	2.5	13.3	0.8	32,750
Fattening swine:					
First period	36	4.5	25.0	0.7	57,800
Second period	32	4.0	24.0	0.5	54,200
Third period	25	2.7	18.0	0.4	40,200

It should be borne in mind that feeding standards are simply a concise and approximate statement of the amounts of the different nutrients required by animals, as indicated by the results of experiments and observation, and are intended to apply to the average conditions. No single standard can be laid down for all conditions. Good judgment and intelligent observation on the part of the feeder are also necessary. The value of any ration which may be determined upon may be calculated with the aid of the feeding standards and the figures in Table I. Suppose four pounds of oats constitute one of the ingredients of a ration. According to the table, it is evident that if 100 pounds of oats furnish 9.25 pounds digestible protein, one pound will furnish .0925, and four pounds will furnish .3700. In the same way, if 100 pounds of oats supply 124,760 calories of energy, one pound will furnish 1247.60 calories and four pounds will furnish 4990.40. The sums of the protein supplied by all the feeds show the total amount in the ration, and so on, with all the other nutrients, and with the energy. In making such calculations, it is a common practice to consider only the protein and energy value since these factors show the essential features of the food and the calculation is somewhat simplified without materially lessening the value of the results. It is not necessary that a ration should furnish each day the exact amount called for by the standard but rather that it should approximate it through long periods, a slight deficiency at one time being made up by a corresponding excess at another. In calculating rations it is essential that weights be used rather than measures. It is often inconvenient to weigh the grains, but the weight may be calculated with sufficient accuracy by the figures given below, which show the weight of a quart of a number of common feeding stuffs.

Some of these materials, especially by-products like wheat bran, vary considerably in weight, and the given figures cannot be regarded as strictly accurate. Weighing is, of course, always the safer way where it is desired to feed quite definite amounts. In selecting feeding stuffs for his stock, the farmer will naturally be governed by the conditions of the market. The cost of feeding stuffs is controlled by other factors than the actual amounts of food materials which they contain; indeed, there often appears to be very little connection between the two. Bearing in mind that the protein is the most expensive ingredient, and the one especially sought in concentrated feeds, the farmer can make his selection with the aid of such data as are given in Table I. Of course, the special adaptability of some materials to different kinds of animals and different purposes will also be taken into account.

WEIGHT OF FEEDING STUFFS PER QUART.

	lbs.	ozs.
Corn cracked	1	12
Corn meal	1	8
Corn-and-cob-meal	1	6
Oats, whole	1	..
Oats, ground	..	12
Wheat, whole	1	14
Wheat bran	..	10
Wheat bran, coarse	..	8
Wheat middlings	1	2
Wheat middlings, coarse	..	13
Gluten meal	1	11
Gluten feed	1	3
Linseed meal	1	2
Cotton-seed meal	1	8

Another important consideration where fertilizers or manures have to be relied upon is the manurial value of a feeding stuff. If the manure is carefully preserved a large proportion of the fertilizing constituents of the feed is recovered in the manure, and goes to enrich the land. (See FERTILIZERS.)

Feeding Stuff Inspection.— A number of dif-

ferent States have passed laws requiring that the composition of certain classes of feeding stuffs be guaranteed by the manufacturer, and providing an inspection of these goods to see that the guaranty is complied with. These laws in general apply only to the so-called concentrated feeding stuffs, especially the by-products and mixed feeds, and not the cereal grains sold as such. The inspection is usually in charge of the Agricultural Experiment Stations; and is managed very similarly to the fertilizer inspection. The need for this inspection arises from the quite wide variation in the composition of many of the by-products, the confusion of names, as in the case of the by-products from starch manufacture, the large number of mixed feeds which are put upon the market under proprietary names, and the occasional tendency to mix with the material substances of inferior value. The feeding stuff inspection protects the farmer from fraud in the same way as the fertilizer inspection, and gives him the benefit of a guaranteed composition in buying. The result of this inspection, which has been in operation a number of years, has been quite marked in driving inferior grades of goods, like adulterated cotton-seed meal, out of the market, and tending to bring about greater uniformity in composition in the case of standard by-products.

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Nutrition of Man. To be properly nourished, man must be supplied at suitable intervals with the foods which will best serve to build the body, maintain it in health, and permit of the performance of the necessary amount of mental and physical work. Food may accordingly be defined as that which taken into the body, builds tissue, or yields energy. Blood and muscle, bone and tendon, brain and nerve, in fact, all the organs and tissues of the body, are formed from the nutritive ingredients of food, and with every motion of the body, and doubtless with the exercise of feeling and thought as well, some material is consumed which must be re-supplied by the food. If the food supply is just sufficient for the needs of the body, the weight remains constant, except for the daily fluctuations dependent upon the water consumed, contents of the intestinal tract, etc. If the food supply is insufficient, the body loses weight, while if more is consumed than is needed, reserve material, usually fat, is stored and the body gains in weight. In one sense, the body is a machine of a superior sort. Like other machines, it needs materials to build its several parts, to repair them when worn out and to serve as fuel. It uses this material like a machine in some ways, and in others differently. The engine gets its power from fuel and so does the body,—in the one case, coal or wood, and in the other, meat, bread, milk, etc., serving this purpose. In both cases, the energy latent in the fuel and called potential energy is transformed into heat and power. When coal is burned in a furnace, some of its potential energy is transformed into the mechanical power used by the engine for its work; the remainder is wasted in the heat not utilized by the engine. In a similar way, the potential energy of food is transformed in the body into heat, to keep the body warm, and into mechanical power employed for muscular work, but this is done more economically than by the engine. If more heat is generated than is required, it is wasted, just as in the case of the engine. The human machine differs in one important particular from the steam-engine, namely, it is self-building, self-repairing and self-regulating. Then, too, if need be, the body can use its own substance, stored fat, for instance, as fuel, and the engine cannot. But besides all this, the body is more than a machine. It has not only organs to build and maintain, but has a nervous organization as well as sensibilities and the higher intellectual and spiritual faculties, and it seems fair to insist that the right exercise of these depends upon the proper nutrition of the body.

Composition of Foods.—The study of foods has shown that although they differ so much in texture and appearance, they are in reality made up of a few chemical constituents, namely, protein, fat, carbohydrates and ash, together with a larger or smaller amount of water. The latter can often be seen, as in the juice of fresh fruits or meat. In flour or dried beef, no water or juice is visible, but a small amount is contained in the tissues in minute particles, and may be separated in the laboratory. Protein is the name given to the total group of nitrogenous materials present. The group is made up mainly of the true proteids such as the gluten of wheat, the albumen of egg, etc., and nitrogenous materials such as amids which are believed to have a lower food value than the albumens.

The group "fat" includes the fat of meat, as suet and lard, the fat of milk (butter), true vegetable fats and oils like olive oil or the oil in corn, as well as vegetable wax, some chlorophyl (the green coloring matter in leaves, etc.), and other vegetable coloring matters, in brief, all the materials which are extracted by ether in the usual laboratory methods of estimating fat. The name "ether extract" is often and quite properly applied to this group.

The group "carbohydrates" includes starches, sugars, crude fibre, cellulose, pentosans, and other bodies of a similar chemical structure. This group is usually subdivided, according to the analytical methods followed in estimating it, into "nitrogen-free extract" and "crude fibre"; the former subdivision including principally sugar, starches, and most of the pentosans, and the latter cellulose, lignin, and other woody substances which very largely make up the rigid structure of plants. The carbohydrates occur chiefly in vegetable foods, though some are found in animal foods, milk-sugar being a familiar example.

The group "mineral matter" includes the inorganic bodies present in the form of salts in the juices and tissue of the different food, the principal chemical elements found being sodium, potassium, calcium, magnesium, chlorin, fluorin, phosphorus, and sulphur. The term "ash" is often and very appropriately used for this group, since the mineral matter represents the incombustible portion which remains when any given food is burned.

Food, as we buy it at the market or even as served on the table, contains a large or smaller amount of material, which is not or cannot be eaten, and which would have little or no nutritive value if it were eaten, such, for instance, as the bones of meat and fish, the shells of eggs, and the skins and seeds of vegetables and fruits.

In discussing the chemical composition of foods, such portions are usually spoken of as refuse, but they form an important item when the actual cost of the nutrients of food is considered. The materials grouped together as refuse contain the same ingredients as the edible portion, though generally in quite different proportions. Thus bones are largely mineral matter with a little fat and protein. Bran of wheat contains a large amount of crude fibre or woody material, with a little starch, etc. In some cases, material which is edible is classed as refuse because the flavor is objectionable. Thus peach or plum pits are too highly flavored to be palatable, and if eaten in quantity are undoubtedly actually injurious. The edible portions of food which are rejected in its preparation or at the table are spoken of as waste. The chemical composition of a food serves as a basis for judging of its value for building and repairing body tissue. Its value as a source of energy must, however, be learned in another way. The most usual way of measuring energy is in terms of heat, the calorie being taken as a unit. This is the amount of heat which would raise the temperature of 1 kilogram of water 1° C., or 1 pound of water 4° F. Instead of this, the unit of mechanical energy, the foot-ton (the force which would lift 1 ton 1 foot), may be used, but it is not as convenient. One calorie corresponds very nearly to 1.54 foot-tons.

Fuel Value of Food.— The fuel value of any food is equal to its heat of combustion less the energy of the excretory products derived from it, and may be learned by taking into account the chemical composition of the food, the proportions of the nutrients actually digested, and oxidized in the body, and the proportion of the whole latent energy of each, which becomes active and useful to the body for warmth and work. However, the fuel value may be and often is calculated from the composition of the food material supplied, on the assumption that 1 gram of protein furnishes 4 calories, 1 gram fat 8.9 calories, and 1 gram carbohydrates 4, calories, or one pound protein 1,820 calories, 1 pound fat 4,040 calories, and 1 pound carbohydrates 1,820 calories.

The relation between the quantities of nitrogenous and nitrogen-free nutrients in the ration is called the "nutritive" or "nutrient ratio." In calculating this ratio, 1 pound of fat is taken as equivalent to 2.25 pounds of carbohydrates — this being approximately the ratio of their fuel values — so that the nutritive ratio is actually that of the protein to the carbohydrates plus 2.25 times the fat.

All the organs and tissues of the body contain nitrogen. Protein is the only nutrient which supplies this element, and is therefore essential for building and repairing body tissues. The other elements required, namely carbon, oxygen, and hydrogen, may be supplied theoretically, at least, by protein, fat or carbohydrates; but a well-balanced diet should contain all the nutrients in proper proportion. Protein, fat, and carbohydrates may be burned with the formation of carbon dioxid and water, and therefore all may serve as a source of energy, but for protein this is the less important, and probably less usual function. The fats and carbohydrates by being themselves used as fuel, leave the protein for its indispensable work of tissue forming. In an ordinary mixed diet, meat, fish and milk, among animal foods, and cereals among vegetable products, are the chief sources of protein. About nine tenths of the fat in the ordinary diet is supplied from animal foods, while approximately nine tenths of the carbohydrates are furnished by vegetable foods.

The mineral matter in food is required for a number of different purposes, a considerable amount being needed for the formation of the skeleton. Some is also present in the organs and tissues. It cannot, however, be regarded as a source of energy, according to commonly accepted theories, since it cannot be burned with the formation of carbon dioxid and water. The water present in the food is not a nutrient in the sense that it serves for building tissue or yielding energy, but it is essential, serving for carrying the food in the digestive processes, for diluting the blood, and for many other physiological purposes. The oxygen of the air is required by man as by all living animals for the combustion or oxidation of the fuel constituents of food.

The average composition of a number of common foods and the energy which one pound will furnish when burned in the body, are shown in Table I., on the following page.

It will be seen that meats, fish, eggs, milk, fresh vegetables, and fruits contain the most refuse and water; that protein is most abundant in the animal foods and in the dry legumes, and occurs in considerable quantities in the cereals; that fats occur principally in the animal foods; that carbohydrates are found almost exclusively in the vegetable products and milk; and that small quantities of mineral matter are found in practically all food material. The fuel value varies within wide limits, being greatest in those materials which contain the most fat and the least water.

Digestibility of Foods.— One of the most important considerations in fixing upon the value of any given food is its digestibility, in other words, the proportion of its nutritive ingredients which the body can retain and utilize. As frequently employed, the term digestibility has several other significations. Thus, to many, it conveys the idea that a particular food "agrees" with the user, in other words, that it does not cause distress when eaten. The term is also quite commonly understood to mean the ease or rapidity of digestion, and one food is called more digestible than another, because it is digested more easily or in less time. However, the term digestibility, as most commonly used in scientific treatises, refers to thoroughness of digestion. In brief, digestibility consists in rendering insoluble materials soluble, and is accomplished with the aid of digestive ferments and perhaps, though to a smaller degree, by micro-organisms. The principal digestive ferments are contained on the saliva, in the gastric juice of the stomach and the pancreatic juice of the intestine. The saliva has the power of changing starches into sugar. The gastric juice acts upon protein, and the pancreatic juice upon the protein, fat, and carbohydrates. Digestion is aided by fine division of the food in chewing, and by muscular contractions, that is, the so-called peristaltic action of the stomach and intestine, which helps to mix the digestive juices and their ferments with the

TABLE I.— AVERAGE COMPOSITION OF SOME COMMON AMERICAN FOOD PRODUCTS.

Food Materials (as Purchased)	Refuse	Water	Protein	Fat	Carbohydrates	Ash	Fuel value per pound
ANIMAL FOOD.	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Calories
Beef, fresh:							
Flank	10.2	54.0	17.0	19.0	....	0.8	1,105
Porterhouse steak	12.7	52.4	19.1	17.9	....	.8	1,100
Sirloin steak	12.8	54.0	16.5	16.1	....	.9	975
Rib rolls	....	63.9	19.3	16.7	....	.9	1,055
Corned beef	8.4	49.2	14.3	23.8	....	4.6	1,245
Veal: Breast	21.3	52.0	15.4	11.0	....	.8	745
Leg cutlets	3.4	68.3	20.1	7.5	....	1.0	695
Mutton: Leg, hind	18.4	51.2	15.1	14.7	....	.8	890
Loin chops	16.0	42.0	13.5	28.3	....	.7	1,415
Lamb, leg (hind)	17.4	52.9	15.9	13.6	....	.9	860
Pork, fresh:							
Ham	10.7	48.0	13.5	25.9	....	.8	1,320
Loin chops	19.7	41.8	13.4	24.2	....	.8	1,245
Tenderloin	....	66.5	18.9	13.0	....	1.0	895
Pork, salted, cured, and pickled:							
Ham, smoked	13.6	34.8	14.2	33.4	....	4.2	1,635
Salt pork	....	7.9	1.9	86.2	....	3.9	3,555
Bacon, smoked	7.7	17.4	9.1	62.2	....	4.1	2,715
Poultry:							
Chicken, broilers	41.6	43.7	12.8	1.4	....	.7	305
Fowls	25.9	47.1	13.7	12.3	....	.7	765
Turkey	22.7	42.4	16.1	18.4	....	.8	1,060
Fish:							
Cod, dressed	29.9	58.5	11.1	.2	....	.8	220
Mackerel, whole	44.7	40.4	10.2	4.2	....	.7	370
Shad, whole	50.1	35.2	9.4	4.8	....	.7	380
Shellfish:							
Oysters, "solids"	....	88.3	6.0	1.3	3.3	1.1	225
Lobsters	61.7	30.7	5.9	.7	.2	.8	145
Hen's eggs	11.2	65.5	13.1	9.3	....	.9	635
Dairy products:							
Butter	....	11.0	1.0	85.0	....	3.0	3,410
Whole milk	....	87.0	3.3	4.0	5.0	.7	310
Skim milk	....	90.5	3.4	.3	5.1	.7	165
Buttermilk	....	91.0	3.0	.5	4.8	.7	160
Cream	....	74.0	2.5	18.5	4.5	.5	865
Cheese, full cream	....	34.2	25.9	33.7	2.4	3.8	1,885
VEGETABLE FOOD.							
Flour, meal, etc.:							
Entire wheat flour	....	11.4	13.8	1.9	71.9	1.0	1,650
Graham flour	....	11.3	13.3	2.2	71.4	1.8	1,645
Wheat flour, patent roller process:							
High-grade and medium	....	12.0	11.4	1.0	75.1	.5	1,635
Low-grade	....	12.0	14.0	1.9	71.2	.9	1,640
Wheat breakfast food	....	9.6	12.1	1.8	75.2	1.3	1,680
Corn meal	....	12.5	9.2	1.9	75.4	1.0	1,635
Oat breakfast food	....	7.7	16.7	7.3	66.2	2.1	1,800
Rice	....	12.3	8.0	.3	79.0	.4	1,620
Tapioca	....	11.4	.4	.1	88.0	.1	1,650
Bread, pastry, etc.:							
White bread	....	35.3	9.2	1.3	53.1	1.1	1,200
Whole-wheat bread	....	38.4	9.7	.9	49.7	1.3	1,130
Crackers	....	5.9	9.8	9.1	73.1	2.1	1,875
Molasses	....	....	....	....	70.0	....	1,225
Honey	....	....	....	....	81.0	....	1,420
Sugar, granulated	....	....	....	....	100.0	....	1,750
Vegetables:							
Beans, dried	....	12.6	22.5	1.8	59.6	3.5	1,520
Beans, lima, shelled, green	....	68.5	7.1	.7	22.0	1.7	540
Cabbage	15.0	77.7	1.4	.2	4.8	.9	115
Corn, green (sweet) edible portion	....	75.4	3.1	1.1	19.7	.7	440
Lettuce	15.0	80.5	1.0	.2	2.5	.8	65
Onions	10.0	78.9	1.4	.3	8.9	.5	190
Peas, green, shelled	....	74.6	7.0	0.5	16.9	1.0	440
Potatoes	20.0	62.6	1.8	.1	14.7	.8	295
Sweet potatoes	20.0	55.2	1.4	.6	21.9	.9	440
Tomatoes	....	94.3	.9	.4	3.9	.5	100
Turnips	30.0	62.7	.9	.1	5.7	.6	120
Fruits, berries, etc., fresh:							
Apples	25.0	63.3	.3	.3	10.8	.3	190
Bananas	35.0	48.9	.8	.4	14.3	.6	260
Grapes	25.0	58.0	1.0	1.2	14.4	.4	295
Oranges	27.0	63.4	.6	.1	8.5	.4	150
Pears	10.0	76.0	.5	.4	12.7	.4	230
Raspberries	....	85.8	1.0	....	12.6	.6	220
Strawberries	5.0	85.	.9	.6	7.0	.6	150
Fruits, dried:							
Dates	10.0	13.8	1.9	2.5	70.6	1.2	1,275
Figs	....	18.8	4.3	.3	74.2	2.4	1,280
Raisins	10.0	13.1	2.3	3.0	68.5	3.1	1,265
Nuts: Almonds	45.0	2.7	11.5	30.2	9.5	1.1	1,515
Chestnuts, fresh	16.0	37.8	5.2	4.5	35.4	1.1	915
Cocoanuts	48.8	7.2	2.9	25.9	14.3	.9	1,295
Hickory nuts	62.2	1.4	5.8	25.5	4.3	.8	1,145
Pecans	53.2	1.4	5.2	33.3	6.2	.7	1,465
Peanuts	24.5	6.9	19.5	29.1	18.5	1.5	1,775
Walnuts, English	58.1	1.0	6.9	26.6	6.8	.6	1,250
Chocolate	....	5.9	12.9	48.7	30.3	2.2	5,625
Cocoa	....	4.6	21.6	28.9	37.7	7.2	2,160

food. The digested food passes through the walls of the alimentary canal into the blood and then and later undergoes marked chemical changes. The heart pumps the blood containing the nutrients of the digested food, and the oxygen which it gets in the lungs, all over the body, and thus the organs and tissues are supplied with the materials which they need for their particular functions. At the same time, the blood carries away the waste which the exercise of these functions has produced. The living body tissue has the power of selecting the necessary materials from the blood and building them into its own structure, but just how it does this it is not possible to say.

The parts of the food which the digestive juices do not or cannot dissolve, and which therefore escape digestion, are periodically given off by the intestine. Such solid excreta, or fæces, include not only the particles of undigested food, but also the so-called metabolic products, that is, residues of the digestive juices, bits of the lining of the alimentary canal, etc. The other excretory products are the urine, respired air and perspiration.

The chemical elements of which this bodily waste is composed are, of course, the same as those making up the body and its food, namely, carbon, oxygen, nitrogen, calcium, etc. Most of the carbon and part of the oxygen are given off from the lungs as carbon dioxid. Hydrogen unites with some oxygen to form water, which is excreted in the form of vapor from the lungs, in the perspiration from the skin, and urine from the kidneys, which latter contains also nearly all the nitrogen, most of it in the form of urea. Waste mineral matters are given off to some extent in the perspiration but mainly through the kidneys and intestine. Although sometimes studied by methods of artificial digestion, the digestibility of any food may be most satisfactorily learned by actual tests, the method being, in general, the same as in experiments with animals. (See NUTRITION OF FARM ANIMALS.) From a large number of experiments, it has been calculated that on an average the different groups into which foods may for convenience be divided, have the following coefficients of digestibility:

TABLE II.— COEFFICIENTS OF DIGESTIBILITY OF NUTRIENTS AND THEIR FUEL VALUE PER POUND IN DIFFERENT GROUPS OF FOOD MATERIALS.

Food Material	Protein		Fat		Carbohydrates	
	Digestibility	Fuel value per pound	Digestibility	Fuel value per pound	Digestibility	Fuel value per pound
	Per cent	Calories	Per cent	Calories	Per cent	Calories
Fish and meats	97	1,940	95	4,040	98	1,730
Eggs	97	1,980	95	4,090	98	1,730
Dairy products	97	1,940	95	3,990	98	1,730
Animal food (of mixed diet)	97	1,940	95	4,050	98	1,730
Cereals	85	1,750	90	3,800	98	1,860
Dried legumes	78	1,570	90	3,800	97	1,840
Sugars	..	....	..	....	98	1,750
Starches	..	....	..	....	98	1,860
Vegetables	83	1,410	90	3,800	95	1,800
Fruits	85	1,520	90	3,800	90	1,630
Vegetable foods (of mixed diet)	84	1,840	90	3,800	97	1,820
Total food (of mixed diet)	92	1,820	95	4,050	97	1,820

As a general rule, it may be said that carbohydrates are more completely digested than protein and fat, and that the protein of animal foods, as meat, milk, fish, and eggs is more digestible than that supplied by vegetable foods. In determining the value of food, more complicated experiments are frequently resorted to. Thus the income and outgo of nitrogen or nitrogen and carbon forms a means of judging of the processes which are going on in the body. Some of the most valuable experiments have been made with a special device called the respiration calorimeter (q.v.), which permits of the measurement of the total income and outgo of matter and energy.

The information gained from a study of the composition and nutritive value of foods may be turned to practical account by using it in planning diets for different individuals or classes of individuals or in estimating the true nutritive value of foods actually consumed by families or individuals, that is, by making dietary studies. The plan followed in making dietary studies which may be of any convenient number of days' duration, is as follows: Exact account is taken of all the food materials (1) on hand at the beginning of the study; (2) purchased during its progress; and (3) remaining at the end. The difference between the third and the sum of the first and second is taken as representing the amounts used. The amounts of nutrients and energy furnished by the total quantity of each food material are calculated through the aid of figures obtained from analyses of samples of the different foods or from tables of average composition like Table I. above. Deducting from the total amounts of the several nutrients and energy, the amounts found in the kitchen and table refuse, the quantities actually consumed are obtained. Account is also taken of the number of meals eaten by different members of the family or group studied and by visitors if there are any. From the total food eaten by all the persons during the entire period, the amount eaten per man per day can be calculated. Observation has shown that as a rule, a woman requires less food than a man and that young children require still less, the amount being dependent upon the age. The amount required by a person varies too with the amount of work performed, more food being evidently needed when a man is engaged at hard labor than when he is idle. The factors which are commonly used in computing the results of dietary studies follow; a man at moderately active muscular work being taken as the standard:

FACTORS USED IN CALCULATING THE RESULTS OF DIETARY STUDIES.

Man at hard muscular work needs per meal or per day 1.2 the food of a man at moderately active muscular work.

Man with light muscular work and boy 15–16 years old need, 0.9 the food of a man at moderately active muscular work.

Man at sedentary occupation, woman at moderately active work, boy 13–14, and girl 15–16 years old need 0.8 the food of a man at moderately active muscular work.

Woman at light work, boy 12, and girl 13–14 years old need 0.7 the food of a man at moderately active muscular work.

Boy 10–11 and girl 10–12 need 0.6 the food of a man at moderately active muscular work.

Child 6-9 years old needs 0.5 the food of a man at moderately active muscular work.

From results of many investigations and many physiological experiments, a number of so-called dietary standards have been suggested which are designed to show the amount of nutrients and energy which are required by persons of different occupations and habits of life. The European dietary standards proposed by Voit and the American standards proposed by Atwater, follow:

TABLE III.— DIETARY STANDARDS.

Individual and Occupation	Actually eaten			Digestible			Fuel Value	Nutritive Ratio
	Protein	Fat	Carbohydrates	Protein	Fat	Carbohydrates		
	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Calories	1:
Man at hard work (Voit)	145	100	450	133	95	437	3,270	4.9
Man at moderate work (Voit)	118	56	500	109	53	485	2,965	5.5
Man with very hard muscular work (Atwater)	175	(*)	(*)	161	(*)	(*)	5,500	7.2
Man with hard muscular work (Atwater)	150	(*)	(*)	138	(*)	(*)	4,150	6.2
Man with moderately active muscular work (Atwater)	125	(*)	(*)	115	(*)	(*)	3,400	6.2
Man with light to moderate muscular work (Atwater)	112	(*)	(*)	103	(*)	(*)	3,050	6.1
Man at "sedentary" or woman with moderately active work (Atwater)	100	(*)	(*)	92	(*)	(*)	2,700	6.1
Woman at light to moderate muscular work or man without exercise (Atwater)	90	(*)	(*)	83	(*)	(*)	2,450	6.1

(*) Fats and carbohydrates in sufficient amounts to furnish, together with the protein, the indicated amount of energy.

Preparation of Food.—The preparation of food has much to do with its nutritive value. Thus, many articles which, owing to their mechanical condition or other cause, are unfit for nourishment when raw, are nutritious and palatable when cooked. It is also a matter of common experience that well cooked food is appetizing and wholesome, while the same material if badly cooked is unpalatable. Cooking is of importance for at least three reasons: It changes the mechanical condition, so that the food material may be acted upon more freely by the digestive juices; it makes it more appetizing by improved appearance or flavor, or both; and it kills by heat disease germs, parasites or dangerous organisms if such be present. Food which is attractive to the taste quickens the flow of saliva and other digestive juices, and thus aids digestion. The cooking of meats develops the pleasing taste and odor of extractives and that due to the browned fat and tissues, and by softening and loosening the protein (gelatinoids) of the connective tissues, makes the meat more tender. Extreme heat, however, tends to coagulate and harden the albuminoids of the lean portions, and also to weaken the flavor of extractives. If the heating is carried too far a burned or charred product of bad flavor results. Quite generally foods lose weight in cooking. In the case of meat, a small part of the loss is due to the escape of meat juices and fat, but the chief loss is simply water. The material removed when meat is boiled need not constitute an actual loss if utilized as soup or gravy. In ordinary meat broth, the substances, with the exception of fat, which are dissolved out of the meat, bones and gristle by the water, consist almost wholly of extractives and salts, which are very agreeable and often most useful as stimulants but have little or no value as actual nutriment. In the case of vegetable foods also, the principal material lost in cooking is water driven off by the heat. If vegetables are boiled some sugar and mineral matter is almost always extracted, but such loss is too small to be very important. Heating often changes the structure of food materials very materially so they may be more easily chewed and more easily and thoroughly digested. In many vegetables, the valuable carbohydrates, chiefly microscopic starch grains, are contained in tiny cells with comparatively thick walls on which the digestive juices have little effect. The heat of cooking, especially with the aid of water, ruptures these cell walls and also makes the starch more soluble. The heat also browns or caramelizes a portion of the carbohydrates and produces agreeable flavors in this and other ways.

In the case of breads, cakes, pastry, and other foods prepared from flour, the aim is to make a palatable and light porous food, more easily broken up in the alimentary canal than the raw materials could be. Sometimes this is accomplished simply with the aid of water and heat. In cooking, the heat changes part of the water in the dough into steam, which, in trying to escape, forces the particles of dough apart. The protein (gluten) of the flour stiffens about the tiny bubbles thus formed in the dough and the mass remains porous even after the steam has escaped. More commonly, however, other things are used to "raise" the dough—such as yeast and baking powder. The baking powder when wet gives off the gas carbon dioxid and the yeast causes fermentation in the dough by which the same gas is produced. This gas acts as the steam does, only much more powerfully. When beaten eggs are used to lighten dough, the

albumen encloses air in bubbles which expand, and the walls stiffen with the heat and thus render the food porous. Cleanliness should always be observed in keeping, handling, or serving food. This is required to insure health, as well as for other more obvious reasons. Cleanliness, in this sense, applies not only to freedom from visible dirt, but also from undesirable bacteria, etc.

Cost of Food.—Although the cost of food is one of the chief items in the living expenses of the large majority of the people, very few have any clear ideas regarding the actual nutriment in the different materials they purchase, and too frequently those who wish to economize have little knowledge of the combinations which are best suited to their needs and of the real nutritive value of different foods as related to their cost. In this connection, it is necessary to take into account not only the price per pound, quart or bushel of the different materials, but also the kinds and amounts of nutrients which they contain and their fitness to meet the demand of the body. The cheapest food is that which supplies the most nutriment for the least money, and the most economical food is that which is cheapest and at the same time most adapted to the needs of the hour. It is quite evident that the market price is not regulated by the actual food value. Thus, an ounce of protein or fat from the tenderloin of beef is not more nutritious than that from the round, although it costs considerably more. The attractive appearance of a given food or the buyer's fancy has much to do in regulating the demand and selling price. It is well worth while for housekeepers to become familiar with the true nutritive value of different foods, and to take this into account, as well as flavor, appearance and cost, in the selection of the daily menu.

Diet.—For persons in good health and with good digestion there are two important rules which should be observed in regulating the diet. The first is to select things which agree with the person and avoid those which experience has shown them they cannot digest without harm. The second is to choose such kinds and amounts of food as will supply the materials which the body needs and at the same time will not burden it with superfluous material which must be disposed of at the cost of health and strength. For guidance in this selection, Nature has provided us with instinct and taste which have been trained by experience. Physiological chemistry adds to these the knowledge, still new and not at all adequate, of the composition of food and the laws of nutrition. It is a common practice to be influenced too much by taste, or in other words by the dictates of the palate. Though there may be differences among abnormal persons, for the great majority of people who are in good health, the ordinary food materials such as meat, milk, butter, eggs, cheese, fish, flour, meal, sugar, fruits, potatoes, and other vegetables, make a fitting diet, the main question being to use them in such amounts and proportions as are suited to the actual needs of the body.

Too much food is as bad as too little, and entails a waste of energy as well as a waste of nutritive material. While in the case of some foods purchased, notably meats, more or less waste is unavoidable, the pecuniary loss can be diminished, both by buying those kinds in which there is the least waste, and by utilizing more carefully than is commonly done, portions which are ordinarily classed as refuse. Then, too, much of the waste may be avoided by carefully planning the diet so as to provide a comfortable and appetizing meal in sufficient amount, but without excess. If strict economy is essential, the dearer cuts of meats and the more expensive fruits and vegetables should be avoided. With reasonable care in cooking and serving, a varied and pleasing diet can undoubtedly be furnished at moderate cost. It must be remembered that the real cheapness or dearness of a food depends not only on its market price, but also on the cost of its digestible nutrients, and that the ideal diet is that combination of foods which, while imposing the least burden on the body, supplies it with exactly sufficient material to meet its wants, and that the disregard of such a standard must inevitably prevent the best development of our powers.

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Nuts, hard-shelled fruits, indehiscent, with a hard, dry pericarp, growing on certain trees and bushes in most temperate and tropical regions. The shell, which is often enclosed by woody or leathery husks, does not open of itself when the nut is ripe. Common examples are hazel and hickory nuts. Peanuts and other ground nuts properly belong to another class of fruits. The more important nuts may be divided into two classes: (1) those used for food, and (2) those used for oil, dyeing, and other purposes, medicinal, ornamental, and commercial.

The principal kinds of edible nuts are sweet and bitter almonds (*Amygdalus communis*), native to Asia Minor, northern Africa, southern Europe, and successfully cultivated in California; Brazil-nuts, or nigger-toes, the seeds of a majestic tree (*Bertholletia excelsa*), whose habitat is Venezuela and northern Brazil; bread-nuts growing on a tree (*Brosimum alicastrum*) of Jamaica; several varieties of chestnuts, the American (*Castanea americana*) in the Eastern and Southern States, the Spanish (*Castanea sativa*) in southern Europe, northern Africa, and western Asia, also species found in Australia and Tahiti; cocoanuts, the fruits of the cocoanut palm (*Cocos nucifera*) in the East Indies, West Indies, Florida, South America, and Hawaii; cola, or kola, nuts, the seeds of a tree (*Cola acuminata*) native to West Africa and cultivated in tropical America; hazelnuts, filberts, or cobnuts (*Corylus avellana*) in England, Spain, Sicily, and other parts of Europe, also the American hazel (*C. americana*) and the California hazel; hickory nuts (*Carya alba* and other species) in the United States (from Maine to Texas), and Mexico; pecans (*Carya olivæformis*), in Indian Territory, Texas, Louisiana, and other southern States; pistachios or green almonds (*Pistacia vera*), found in southern Europe, southwestern Asia, and northern Africa; souari or suwarrow nuts (*Caryocar nuciferum*), also called the butternut of Demerara, native to Brazil and Guiana; walnuts (*Juglans regia*), commonly named English or Persian walnuts and Madeira-nuts, in Asia, Europe, Chile, and California, also the black

walnut (*J. nigra*) and the white walnut (*J. cinerea*) or butternut of the United States.

Certain edible nuts are used as sources of oil. The principal kinds are the almond (sweet and bitter), the ben nut of the East Indies, the candle nut of the South Sea Islands, the cashew-nut of the West Indies, the cocoanut of the East Indies, the dika nut of West Africa, the palm nut of West Africa, the pine nuts of Europe and Asia, the physic nut (*Curcas purgans*) of tropical America, the English walnut and the American butternut.

Of nuts having medicinal qualities are the seeds of *Strychnos nux-vomica*, of southern Asia and the East Indies, from which the poisonous drug nux-vomica is obtained, and the betel nuts, fruit of the areca palm (*Areca catechu*), in the East Indies and the Philippines, used as a vermifuge, also said to have stimulant and tonic properties. Some kinds of nuts are turned to account for various practical and ornamental purposes. The boomah nut (*Pycnocoma macrophylla*), of Africa, is used for tanning; nut galls (*Quercus infectoria*), of the Levant, for dyeing and ink-making; soap-nuts (*Sapindus saponaria*), of the West Indies, in washing. The horse chestnut (*Æsculus hippocastanum*), of Europe, contains starch. The cumara nut (*Dipterix odorata*), of Brazil, is valuable for its perfume. The sassafras nut (*Nectandra puchury*), of Brazil, is used in flavoring chocolate. Ravensara nuts, also called the Madagascar clove nutmeg, are useful for seasoning. Many species of nuts are prized as ornaments. Betel nuts are utilized as coat buttons; bladder nuts (*Staphylea pinnata*), of Central Europe, are worn as beads in necklaces; also the bonduc nut (*Guilanderia bonduc*), of India, and the grugru nut (*Acrocomia schlerocarpa*), of South America, are used as breads. The corozo nut or vegetable ivory, of Brazil and Colombia, is made into toys, and the coquilla nut (*Attalea funifera*), of Brazil, is valuable for decorative turnery.

The demand for nuts as an article of commerce is constantly growing. The value of nuts, domestic and foreign, annually marketed in the United States, is about $7,000,000. The consumption of home-grown nuts cannot be accurately estimated. The yearly exports of domestic nuts amount to $300,000, of which pecans (the most important of native nuts) form a considerable item. Imports during the fiscal year 1902–3 amounted to nearly $5,000,000, the bulk being of three kinds: almonds ($1,337,717), walnuts ($1,106,033), and cocoanuts ($908,242). The most popular varieties of almonds are from Tarragona and Ivica, Spain, and from Formigetta, France. Shelled almonds, which are largely used by confectioners, for the most part come from Spain, Sicily, and Italy. The walnuts from Grenoble, France, are said to be the best, and those from Naples have a fine flavor. Importations of cocoanuts are chiefly from South America and the West Indies. Of other nuts, filberts or hazels come principally from Italy, Sicily, and Spain, chestnuts from France and Italy, and Brazils from South America.

Recent experiments tend to show that the food value of nuts is much greater than was formerly supposed. Many savages and wild animals depend largely upon nuts for sustenance through long periods of the year. According to a missionary of the Kongo, the natives subsisted almost entirely upon cola nuts during a famine lasting months. Among civilized people nuts have been looked upon as accompaniments to a feast, promoting cheerfulness and pleasant talk. They serve this purpose and more, for as sources of protein and fat they furnish considerable nutritive material and energy. Where other provisions are deficient in protein or albuminoids and fat, almonds and walnuts supply this lack. The chestnut may be used as a substitute for the cereals, because of its high proportion of starch, sugar, and dextrin. In some parts of Asia nut oil is used considerably in cooking.

Almonds, Brazilnuts, filberts, hickory nuts, pecans, walnuts, chestnuts, and other nuts contain in concentrated form a great deal of nourishment. When bought at ordinary prices, they should not be considered luxuries but fairly economical articles of diet. Investigations carried on at the Agricultural Experiment Station of the University of California in 1901–2 emphasize the fact that nuts are to be regarded as true foods rather than food accessories.

Samples are selected from Woods and Merrill's analyses of nuts. The edible portion of almonds contains: water, 6 per cent; protein, 23.5; fat, 53; carbohydrates, 7; ash, 3.9; fuel value per pound, 3,329 calories. Almonds are generally eaten as dessert, as is the Brazil-nut, whose edible portion contains: water, 5.3; protein, 17; fats, 66.8; carbohydrates, 7; ash, 3.9; fuel value per pound, 3,329. The chestnut (Spanish, dry) contains: water, 6.6; protein, 9; fat, 6.6; carbohydrates, 75; ash, 2.8. The chestnut is widely grown in France, where large quantities are used as food by both poor and well-to-do classes. Dried chestnuts are ground to flour and baked in cakes. In Italy the chestnut is eaten fresh, boiled, and roasted, also in the form of porridge. Chestnut cake is a common delicacy among the peasants of the Apennines. In Korea the chestnut practically serves as a substitute for the potato, being cooked in several ways. In some countries chestnuts are used for fattening hogs and other animals. The edible portion of the filbert contains: water, 3.7; protein, 15.6; fat, 65.3; carbohydrates, 13; ash, 2.4; fuel value per pound, 3,432. The filbert is eaten chiefly as a dessert in England and America. In some countries of Europe it is often roasted, and it is sometimes ground to a flour and made into bread. It is grown in enormous quantities about Trebizond. The fruit of the shag-bark hickory is a great favorite with Americans. The edible portion of the hickory nut contains: water, 3.7; protein, 15.4; fat, 67.4; carbohydrates, 11.4; ash, 2.1; fuel value, 3,495. The pecan (*Hicoria pecan*) is the most popular of American nuts. The edible portion of the pecan contains: water, 3; protein, 11; fat, 71.2; carbohydrates, 13.3; ash, 1.5; fuel value per pound, 3,633. The English walnut ranks next to almonds in popularity. In Korea it is a regular article of diet. The edible portion of the walnut (Italian, *J. regia*) contains water, 4; protein, 16.9; fat, 68; carbohydrates, 9; ash, 2; fuel value per pound, 3,538. As there is practically no refuse in the composition of nuts, other food substances having bulk should be eaten with them. Vegetarians point to the lithe, active squirrel and recommend the eating of nuts for

reducing the abdomen and increasing agility. The fact that Americans do not appreciate the food value of nuts as much as Europeans and Asiatics do, is attributed to the abundance of fruits and cereals in this country. The increasing demand, however, is encouraging nut culture in California and other States. The number of nut-trees and their products in the United States as reported by the Twelfth census was as follows:

	Trees	
Almond	1,649,072	7,142,710 lbs.
Cocoanut	48,919	145,000
Pecan	643,292	3,206,850 lbs.
Persian English Walnut	726,798	10,668,065 lbs.
Miscellaneous nuts	834,460	380,224 bu.
Value of all nuts		$1,959,161

Consult: A. Broadbent, 'Fruits, Nuts, and Vegetables,' U. S. Consular Reports, 1898, No. 219; C. D. Woods and L. H. Merrill, 'Nuts as Food,' 15th Annual Report Maine Agricultural Experiment Station, (1900); M. E. Jaffa, 'Further Investigations among Fruitarians,' etc., U. S. Dept. of Agriculture, E. S. R. No. 132 (1903); 'Reports Twelfth Census,' Vol VI. (1900); 'Nut Culture in the United States,' U. S. Dept. of Agriculture, Division of Pomology (1896); Parry, 'Nuts for Profit' (1897); Fuller, 'The Nut Culturist' (1896).

EUGENE PARSONS,
Author and Editor.

Nutt, nŭt, **Alfred Trubner,** English folk-lore scholar: b. London 22 Nov. 1856. His education was obtained at University College School and the Collège de Vitry François, and after serving from 1874 a three-years' apprenticeship in the book publishing business on the Continent, succeeded to that of his father, David Nutt, in London, in 1877. He joined the Folk Lore Society soon after and was elected its president in 1897. He founded the English Goethe Society in 1886 and was one of the founders of the Irish Texts Societies in 1898. He has writen 'The Legend of the Holy Grail with Especial Reference to the Hypothesis of its Celtic Origin' (1888); 'The Voyage of Bran' (1895–7).

Nuttall, nŭt'al, **Thomas,** English-American naturalist: b. Long Preston, Settle, Yorkshire, England, 5 Jan. 1786; d. Nutgrove, near St. Helens, Lancashire, England, 10 Sept. 1859. He learned printing, came to the United States in 1807; traveled widely; made numerous discoveries in botany; ascended the Missouri River in 1811, the Arkansas in 1819, and in 1825–34 was professor of natural history and curator of the botanic gardens at Harvard. In 1834 he explored the Oregon and Upper California. From 1842 he resided in England. Among his publications were: 'The Genera of North American Plants' (1818); 'A Journal of Travels into the Arkansas Territory' (1821); 'Introduction to Systematic and Physiological Botany' (1827); 'A Manual of the Ornithology of the United States and Canada' (1834); and 'The North American Sylva: Trees not Described by F. A. Michaux' (1842–9).

Nutting, nŭt'ing, **Mary Olivia,** American writer: b. Randolph Centre, Vt., 1 July 1831. She was graduated from Mount Holyoke Seminary (now College) in 1851, taught there 1853–70, was librarian of the institution 1870–1901, and since the last-named date, librarian emeritus. She has published 'Steps in the Upward Way' (1867); 'Our Summer at Hillside Farm' (1867); 'The Story of William the Silent' (1869); 'The Days of Prince Maurice' (1894); etc.

Nuwas, noo'väs. See ABU-NUVAS.

Nux Vom'ica, the popular name for the seeds of a tree (*Strychnos nux-vomica*) of the natural order *Loganiaceæ*. The tree is a native of Ceylon, Coromandel, and other parts of southern Asia. It is of medium size, bears oblong, entire smooth leaves, and flowers in terminal corymbs, followed by one-celled berries as large as oranges. They have brittle shells, white gelatinous pulp, and flat, disk-like hairy gray seeds which are tough, odorless, and very bitter. The pulp is a favorite food of many birds. The seeds have long been used in pharmacy and medicine, and are the source of the alkaloids strychnin and brucin. Under the name false Angostura bark the bark of this tree has been used to adulterate the true Angostura bark, from which it differs in its properties.

Nyack, nī'ăk, N. Y., village in Rockland County; on the Hudson River, where the expansion is called Tappan Bay, and on a branch of the Erie Railroad. It is connected by ferry with Tarrytown on the opposite side of the Hudson, and it is about 26 miles from the Grand Central Station in New York. It was settled in 1700, incorporated as a village in 1873, gave up its charter in 1876, and was again incorporated in 1883. It is a beautiful residential village, but has some manufacturing. The chief industrial establishments are boot and shoe factories, wagon, carriage, and sleigh factory, yacht, boat-building, and cloth finishing works. For many years it has been an educational centre; it is the seat of the Nyack Military Academy, the Hudson River Military Academy, and the Rockland Military Academy. It has public and parish schools, a public library, and several good church buildings, notably Saint Ann's (R. C.), the interior of which is beautifully decorated. The village owns and operates the waterworks. Pop. (1890) 4,111; (1900) 4,275.

Nyam-Nyam, nyām-nyām', **Niam-Niam,** or **Zandeh,** an African nation, composed of numerous petty tribes dwelling in the basins of the Shari and Welle rivers. They number upward of 2,000,000. They are a branch of the Sandeh tribes, who all belong to the stock of the negroid Nubas. The men devote themselves to hunting and war; the women cultivate the fields and eleusine, manioc, sweet potato, gourds, yam, banana, etc. These with game are the chief food, though a portion of the people are notorious cannibals. They have no cattle. Considerable manual and artistic skill is shown in the forging of iron, making of pottery and baskets, and the carving of wood. They are passionately fond of music, and play a kind of mandolin. Polygamy prevails. The weapons are spears, knives, a species of iron boomerang, and shields.

Nyan, nī-ăn', a large wild sheep (*Ovis hodgsoni*) of the Tibetan Mountains, with great spiral horns on the head of the ram, and yielding excellent mutton. It is called argali by British sportsmen, and is one of the prizes of the chase in the Himalayan region.

Nyangwe, nyäng'wĕ, Africa, a trading station in the Kongo Free State, on the Kongo River; lat. 4° 15′ S.; lon. 26° 20′ E. In 1871 it was visited by Livingston, and in 1876 Stanley made the place his headquarters while exploring the Upper Kongo. It is connected by road with Albertville on Lake Tanganyika. By caravan route, rivers, and steam cars from Leopoldville connections exist with the Atlantic.

Nyanza, nyăn'zą, a Bantu word meaning "great water." It is used as the English word "lake" in connection with the names of three large bodies of water in Central Africa: as, Albert Nyanza, Victoria Nyanza, and Albert Edward Nyanza.

Nyassa, nyăs'sā or nyăs'są (from the Bantu word *nyanza,* that is, "great water"), a lake in southeastern Africa, nearly 400 miles from the Indian Ocean, and west of German East Africa. It extends north and south about 350 miles, and east and west from 20 to 50 miles; area, about 14,300 square miles. It is about 700 feet deep at its southern point, but to north, or its source, it is quite shallow. Toward the south the bed sinks below the level of the Indian Ocean, and at its head the surface is over 1,000 feet above the ocean level. The outlet is Shiré River, which flows south into the Zambesi. With the exception of Murchison Falls and Rapids, 70 miles long, in the Shiré River, there exists unbroken water communication between the head of Nyassa and the Indian Ocean. The African Lake Company have launched steamers on the lake, investigated the coast, and made a road from the north end of the lake up the heights to the plateau between Nyassa and Tanganyika (q.v.). Another road has been made around the rapids in the Shiré River. On the west and east coasts are mountains, those on the east are from 4,000 to 11,000 feet in height. In some places low sandy land extends between the water and the mountain, and in other parts, as at the north, the mountains come down to the water. A number of rivers flow into the lake from the west; they have broken through the mountain barrier. Livingstonia (q.v.) on the south, Bandawé on the west, and a number of other small villages or hamlets have been established along the coast.

Nyâya, nyā'yą. See HINDUISM.

Nyc"tipithe'cus. See DOUROUCOULI.

Nyd'ia, a character in Bulwer's 'Last Days of Pompeii.' She is a blind flower girl, of good birth, rescued from slavery by the hero.

Nye, nī, **Edgar Wilson,** American humorist: b. Shirley, Maine, 25 Aug. 1850; d. near Asheville, N. C., 22 Feb. 1896. He removed when a young man to Wyoming Territory; studied law, and was admitted to the bar in 1876. Subsequently he made his home in New York and became widely known as a humorous lecturer and writer under the pseudonym of "Bill Nye." He was the author of 'Bill Nye and Boomerang' (1881); 'Forty Liars' (1883); 'Remarks' (1886); 'Fun, Wit, and Humor' (1889), with J. W. Riley; 'Comic History of the United States' (1894); 'Comic History of England' (1896); 'Baled Hay'; etc.

Nyezhin, nyĕ'zhēn. See NIZHAN.

Nyiregyháza, nyē-rĕd-y-hā'zŏ, Austria-Hungary, town in the district of Szabolcs; on the Nyir River, and at the junction of two railroads, about 170 miles by rail northeast of Budapest. It is in a productive agricultural region in which wheat, grapes, and a variety of fruits grow luxuriantly. It is in the vicinity of the Tokay wine region. There are a number of manufacturing industries, among which are the manufacturing of matches, soda, and saltpeter. Pop. (1902) 35,110.

Nyköping, nü'hē-pĭng, Sweden, seaport, on a bay of the Baltic Sea; about 60 miles southwest of Stockholm. In the 13th century this was one of the most important places in Sweden. The castle, now a ruin, ranked in strength with those of Stockholm and Calmar. In 1719 the town was captured and nearly destroyed by the Russians. It has regular steamer communications with Stockholm and other ports, and is of considerable manufacturing and commercial importance. Pop. (1901) 7,375.

Nyl'ghau. See NILGAI.

Nym Crin'kle. See WHEELER, ANDREW CARPENTER.

Nymph. See PUPA.

Nymphæa'ceæ, an order of aquatic plants, the water-lilies. They are generally large, floating on the surface of the water, and having a stem which forms a subterraneous creeping shoot. The flowers are very large, solitary, with cylindrical peduncles as long as the petioles of the leaves; the perianth is colored, petaloid, composed of a great number of petals, arranged in several rows, and often inserted, as well as the stamens, in the lower part of the sides of the ovary; the outermost of these petals seem to constitute a calyx, while those within form a kind of corolla. The stamens are very numerous; the anthers are turned toward the centre of the flower. The ovary is simple, covered almost throughout by the perianth-segments and by the stamens; it is globular, with several cells, each containing a great number of ovules; the stigma is radiated, peltate, sessile. The fruit is globular, resembling externally a poppy capsule, indehiscent, fleshy within, divided into a great number of cells containing seeds immersed in a fleshy pulp. This order furnishes one of the best examples of the gradual passage of petals into stamens and of sepals into petals; the transition is so insensible that many intermediate bodies are neither precisely petals nor precisely stamens, but part of both. The principal genera of the order are *Euryale, Victoria, Nymphæa,* and *Nuphar.* See LOTUS; VICTORIA REGIA; WATER-LILY.

Nymphs, in Greek mythology, youthful goddesses of inferior rank to the other divinities who dwelt in Olympus. Begotten by Oceanus, or by Zeus and others, they preserve and nourish the woods, rivers, springs, and mountains. They are therefore distinguished according to their offices, as Oceanides, nymphs of the ocean, regarded as daughters of Oceanus; Nereides, or nymphs of the Mediterranean, who were regarded as daughters of Nereus; Leimoniades, or nymphs of the meadows; Dryades or Hamadryades, or nymphs of trees, whose lives were regarded as beginning and ending with those of the trees with which they were asso-

ciated; Melides, or nymphs of fruit-trees; Oreades or Orestiades, or nymphs of mountains and grottoes: these, dressed lightly, as huntresses, were the companions of Artemis (Diana), who was herself originally an Arcadian nymph; there were also Naiades, who presided over fountains, Potamides over rivers, and Limniades over lakes. The nymphs hold a middle station between gods and mortals, and, without being immortal, yet live longer than is permitted to man. At their death the substance which they have supplied with nourishing moisture perishes also. This first notion of nourishment, which is supposed in the very idea of a nymph, seems to have given origin to the second representation of them as nurses of young children entrusted to their care.

Nyoro, nyō'rō, a Bantu tribe living on the shores of Lake Albert Edward, in Africa. As a race they are well built, tall and good-looking. They live in cone-shaped, thatched huts and make dugout canoes and rafts. They lived principally on sweet potatoes, fish and game. They are said to number about 125,000.

Nyrén, nü-rān', **Magnus,** Swedish astronomer: b. Wermland, Sweden, 21 Feb. 1837. He was educated at Upsala and became an instructor in the Pulkova Observatory in 1868. His astronomical researches have been of great value and he was made vice-director of the Observatory at Pulkova in 1890. He has published: 'Bestimmung der Nutation der Erdachse' (1873); 'Variations de la latitude de Poulkova' (1893); etc.

Nys'sa, a genus of trees. See TUPELO.

Nystag'mus, involuntary motion of the eyeballs. The movement is usually lateral, but is sometimes rotatory, and in rare cases vertical. It may be induced by inflammation and other disorders of the eyes, and in miners is not infrequently caused by long-continued work underground in obscure light. Very little in the way of cure is possible.

Nyx, nĭks, in Greek mythology, the goddess of night or darkness. She was the daughter of Chaos. Her brother was Erebus.

O

O the fifteenth letter and the fourth vowel of the English alphabet. Its form may have been suggested by that assumed by the lips in producing the sound. It is called the labial vowel because of the part the lips have in its pronunciation: for analogous reasons the third vowel *i* (ee) is called the palatal and *a* (ah) the guttural vowel. In early Latin writing the *o* was square ◇. In the Greek alphabet there are two characters to represent this vowel, namely, great *o* (omega, Ω, ω) and little *o* (omicron, O, o). The vowel sounds in our language which are represented by *o* are numerous, namely, (1) The sound it has in *oh, lo, cone:* this is the regular, long sound of *o*, and it is common to English with most other languages. Curiously, English seems to lack the short vowel sound corresponding to this long *o:* what is usually called the short *o*, the vowel sound in *on, odd, log,* is not the *o* of *lone* shortened, but rather the sound of *a* in *all* shortened. But though orthoepists hold that the true short open vowel sound of *o* is unknown in English, natives of New England almost invariably in many words shorten the open *o* (as in *go*) without changing its quality; in their pronunciation of *bone, home, coat, toad,* etc., the vowel is the true *o* shortened. This short *o* is not recognized by Alexander J. Ellis as an English vowel sound. The editors of Webster's Dictionary (edition of 1879) remark of this local pronunciation that "its rise and growth are interesting facts, and its final prevalence is a thing he (the theoretic phonologist) would rather desire than deprecate." The long *o* sound is variously represented in English; by *o* (lo), by *ow* (low), by *au* (hautboy), by *eau* (beau), by *eo* (yeoman), by *ew* (sew), by *oa* (roam), by *oe* (hoe), by *oo* (door), by *ough* (dough), by *ou* (shoulder), and by *owe.* (2) The vowel sound commonly called short *o*, as in *odd, cob,* is really, as we have seen, the shortened vowel sound represented by *a* in *all, fall.* (3) The obscure short vowel sound heard in *done, son, ton;* this sound is usually represented by *u*, as in *dun, sun, tun.* (4) The sound of *u* in *rune,* for example, *move, prove.* (5) The same sound shortened, as in *wolf, woman;* the vowel sounds 4 and 5 are the sounds of the fifth vowel in a standard alphabet. (6) The sound usually rendered by broad *a* in *all, call:* examples, *order, former, north.*

O', in Irish proper names, a patronymic prefix corresponding to the Mac of the Highlands of Scotland; thus O'Connell means "the son of Connell." It is supposed to be a corruption of the Irish *ua* (Gaelic, *ogha*), meaning a grandson.

O. P. Riots, or **Old Price Riots,** a public disturbance in London in 1809, occasioned by the opening of the New Covent Garden Theatre. The management increased the prices of admission, and the crowd mobbed the theatre demanding that the old tariff for admission be retained.

Oahu, ō-ä'ho or ō-wä'hoo, one of the Hawaiian Islands, the northernmost large island of the group; length 38 miles, average width about 20 miles. It has an irregular coast line, several small harbors, one excellent harbor on the west coast, upon which Honolulu (q.v.), the capital of Hawaii is situated. Two mountain ranges cross the island, and between is a large dry plain which is productive when irrigated. Mount Kaala, 3,890 feet, is the highest point on the island.

Oak, a genus (*Quercus*) of trees and shrubs of the order *Cupuliferæ.* The species, of which there are about 300, are characterized by alternate simple deciduous or evergreen leaves, inconspicuous monœcious flowers, the staminate, usually in slender pendulous catkins, the pistillate usually nearly sessile and generally solitary or in groups of two or three and developing into "acorns" which are more or less globular or oblong nuts set in the hardened, scaly involucres (cups) which sometimes nearly surround them. Nearly all the species are natives of the northern hemisphere, especially the temperate and colder portions in the latter, of which even the larger species, when present, become reduced to mere shrubs, a peculiarity also exhibited in very sandy, dry or rocky soils. Some species are natives of the warmer parts of the temperate zone, but few are actually tropical. Most of the oaks are noted for strength, durability, longevity and striking individuality of appearance; and on account of these qualities they have been used as symbols by many races, and enter into literature and tradition. Some of the species reach maturity only when 50 to 100 years old, and others even exceed this maximum before reaching a size suitable for lumbermen's purposes. Specimens are known which have reached nearly 1,000 years, and others of half that age are common.

Oaks are generally propagated by seeds planted as soon as mature in the autumn; choice varieties are grafted or budded; and evergreen species are often increased by means of cuttings or layers. In general they thrive best upon well drained, fairly moist, loamy soils, especially such as are well supplied with lime. They are, however, found in all kinds of habitats, including almost pure sand, clay, rocky mountain sides and the mucky soils of undrained swamps. With few exceptions the valuable species are easily grown and readily transplanted while young.

Among the oaks are some of the most valuable trees of the Temperate zone. Their acorns furnish a valuable food for swine, and in some instances are used for human food; their bark is one of the most important barks used in tanning; and their timber, which is noted for its solidity, strength, resistance to moisture, and durability, is one of the most important woods of the world. It is used largely in ship-building, but less now than before the introduction of iron and steel vessels; in railroad and mill construction, bridge building, etc.; and, because of its handsome graining and its ability to receive polish, it is extensively employed in interior finish of houses, in furniture, etc. The galls which grow upon certain species and the bark are widely used as a source of tannin for ink manufacture. Some of the more rapidly growing species are planted largely in Europe in copses, the stems being cut every few years for fuel and for the bark. Few trees are more highly prized by horticulturists and landscape gardeners; but usually the specimens must be in place before the gardener lays out the ground because with most species little effect can be expected under ten years. For this reason other trees of quicker growth are planted with oaks and are removed when the oaks need the space.

About 50 species and half as many hybrids and varieties are natives of the United States, some extending from Nova Scotia to Minnesota and southward to the Gulf States, others being limited to very restricted localities. In general these species belong to two groups, the black oaks and the white oaks. Those of the first group have leaves with pointed tips and acorns that require two years to reach maturity; those of the second have leaves with round lobes and acorns which reach maturity the first year. The most important species is probably the white oak (*Quercus alba*) which has the full range mentioned above. It attains a height of 100 feet, has broadly spreading branches which form an open rounded head, and the light gray bark which gives it its name. It is one of the handsomest of its genus, and being of rather quick growth for an oak, and remarkable for its stateliness, it is often planted in parks. Its timber being compact and remarkably handsome is one of the most prized for furniture. The mossy-cup or bur oak (*Q. macrocarpa*) resembles the white oak in size, appearance and distribution, but its timber, being of coarser grain, is less valued. The chestnut-oak (*Q. prinus*) is a smaller tree, with a broad irregular head and dark brown bark deeply furrowed, and with leaves like those of the chestnut. It ranges from Nova Scotia to Alaska and southward to southern Michigan, Ontario, and Pennsylvania. It is especially valued for its bark, which is exceptionally rich in tannin. The live oak (*Q. virginiana*) is a broadly spreading tree, seldom more than 60 feet tall. It is noted throughout its range, which extends from Virginia southward, for its glossy, dark green leaves and its dense shade, for which it is widely planted in the South for ornament. It is usually draped with Spanish or Florida moss (*Tillandsia*) which also adds to its striking appearance. The red oak (*Q. rubra*) which has a range similar to the white oak, is a rapidly growing, handsome tree sometimes reaching 150 feet and forming a broad round head. Its timber is very heavy, durable and hard, but is coarse-grained. It is less used for the finer work than the white oak. A close relative, the scarlet oak (*Q. coccinea*), is smaller than the preceding, but is similar in range, uses, etc. Both kinds are remarkable for their autumn colors. The water-oak (*Q. nigra*, popularly known as *Q. aquatica*) is common from Delaware southward to the Gulf States. It attains a height of 80 feet, and being of rapid growth it is frequently planted as a street tree in the South. In the North it is not hardy.

The European or British oak (*Q. robur*) has two well marked botanical varieties, one with stemless acorns, the other with acorns on stems. It is a native of western Asia and northern Africa as well as of Europe. About 50 horticultural varieties of this species are in cultivation for ornament, some being introduced into America for this purpose. This is the oak of legendary lore, under whose branches the ancient Druids held their religious ceremonies. It is also the oak used by the navies of Europe for more than a thousand years. The cork-oak (*Q. pseudo-suber*) is a native of the Mediterranean region and is noted for its bark which furnishes the cork of commerce. The gall-oak (*Q. lusitanica*) is a shrub, native to western Asia, and is chiefly useful for its nut-galls (q.v.) which occur upon the leaves as the result of insect attack. The Valonia oak (*Q. ægilops*) common in the same region, is noted for the astringency of its acorns, which are largely used in tanning. The holm, holly or evergreen oak (*Q. ilex*) is a native of southern Europe, and bears acorns used for food.

A very large number of insects live upon the oak, its timber and its decaying wood. One estimate for the United States places this at 1,000; the number actually recorded being between 500 and 600. In Germany, according to Kaltenbach, there are 537. These belong to all orders and include borers, leaf-chewers, sap-suckers, and fruit-eaters. Among the most noted are the oak-tree pruner (*Elaphidion villosum*), a beetle which lays its eggs in the twigs, in the pith of which the larvæ feed until nearly mature, when they chew out a ring of wood nearly to the bark, retire to the semi-severed twig, plug up the burrow and pupate. The wind snaps the twigs; hence the name. Many gall-forming insects, plant-lice, leaf-miners, scale-insects and leaf rollers, feed upon the leaves, which are also often attacked to a damaging extent by the larvæ of numerous lepidopterous insects. Some of the curculios are frequent pests upon the acorns, which are rendered useless for stock food, because their contents have been eaten by the larvæ. Perhaps the most serious pests, however, are the borers, of which there are a large number. These may retard the development of the trees or may so injure the wood by their burrows as to make it unfit for purposes where strength and appearance are necessary. Consult: Packard, 'Fifth Report, United States Entomological Commission' (Washington, 1890).

Oak Apple, any large gall (q.v.) on an oak; specifically, in England, a spongy excrescence on the twigs of *Quercus pedunculata*.

Oak Crown, Order of the. See ORDERS AND DECORATIONS.

Oak Grove, Battle of. After the battle of of Fair Oaks or Seven Pines (q.v.) 31 May–1 June 1862, Gen. McClellan remained inactive

astride the Chickahominy, his advance but five miles from Richmond. In the last week of June Fitz-John Porter's corps of two divisions, with McCall's division, temporarily attached, was on the left bank of the Chickahominy, and held the right of the line. Next on the left, across the stream, was Franklin's corps of two divisions, and on Franklin's left, in the order named, Sumner's and Heintzelman's corps, of two divisions each. Keyes' corps, of two divisions, was in reserve. The effective strength of the army was 92,500, and McClellan was daily calling for more. Lee, including Jackson's command, which was near, stood between him and Richmond with 80,000 men. The bridges being repaired and the ground firm, McClellan, 25 June, determined to advance the left of his picket-line preparatory to a general forward movement. Immediately in front of the most advanced redoubt on the Williamsburg road was a large open field, beyond which was a swampy belt of timber of some 500 to 700 yards, which had been disputed ground for many days. Further in advance was an open field, crossed by the Williamsburg road and the railroad, and commanded by a Confederate redoubt and rifle-pits. It was McClellan's intention to push his lines through these woods in order to ascertain the nature of the ground, and to place Heintzelman and Sumner in position to support an attack to be made by Franklin on the 26th, on the rear of Old Tavern, and which, if successful, would force Lee from the heights overlooking Mechanicsville and clear the way for a general advance on Richmond. The movement began about 9 A.M. by the advance of Hooker's division of Heintzelman's corps on both sides of the Williamsburg road, where a mile separated the Union and Confederate works. Hooker was supported by Kearny's division on the left, and on the right by Richardson's division of Sumner's corps. The Confederate pickets were driven in, and Hooker struck Wright's and Armistead's brigades of Huger's division, which, with a part of Ransom's brigade, made a stubborn resistance, and at 11 A.M., after Hooker on the right had advanced some 800 yards and Kearny nearly a mile, the entire Union line was ordered to fall back; Kearny, however, held on to the ground won. At 1 P.M. McClellan came upon the field and ordered a renewal of the advance. Hooker was reinforced by a brigade of Couch's division, and advanced; Kearny joined in on his left. Mahone's brigade and the rest of Ransom's reinforced the Confederates, and a severe fight ensued, lasting until dark. McClellan says he accomplished his object. The Confederates claim that McClellan was repulsed and gained no material advantage, and that at night they occupied their old positions. This battle, also known as that of Kings school-house, French's Fields, and the Orchards, was the beginning of the Seven Days' Battles (q.v.). The Union loss was 67 killed, 504 wounded, and 55 missing. The Confederate reports show a total loss of 441. Consult: 'Official Records,' Vol. XI.; Webb, 'The Peninsula'; Allan, 'History of the Army of Northern Virginia'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. II. E. A. CARMAN.

Oakeley, SIR **Herbert Stanley,** English composer: b. Ealing 22 July 1830; d. November 1903. He was educated at Rugby, and at Christ Church, Oxford, studied music in England and at the Leipsic Conservatory under Moscheles and Plaidy, and later devoted himself to the organ, working with Breidenstein in Bonn and with Schneider in Dresden. In 1858–68 he was musical critic to the 'Guardian,' in 1865–91 professor of music at Edinburgh, and for many years composer to the Queen in Scotland. In Scotland he furthered orchestral and organ music, and established Students' Choral Associations in the universities. His compositions are principally religious, including anthems, cantatas, hymn tunes, chants, and service-music; but he also wrote some pieces for the pianoforte.

Oaken Crown, Order of the. See ORDERS, ROYAL.

Oakes, ōks, **Urian,** American colonial scholar and clergyman, 4th president of Harvard College: b. England 1631; d. Cambridge, Mass., 25 July 1681. He was brought to America in 1634, showed himself an able mathematician and astronomer when a mere boy, was graduated at Harvard in 1649, studied theology, preached for several years in England, and in 1671 became pastor of the church in Cambridge and fellow of Harvard College. His ambition is supposed to have urged him to rouse dissension against President Hoar, upon whose resignation in 1674 he became acting president, being inaugurated in 1680. He wrote much Latin verse and a famous 'Elegy upon the Death of Thomas Shephard,' selections from which may be found in Tyler, 'History of American Literature.'

Oakland, ōk'land, Cal., city, county-seat of Almeda County; on the San Francisco Bay, and on the Southern P., the Santa Fé, and the Western P. R.R.'s; across the bay from San Francisco, and at the centre of the coast-line of the State. It is connected by the electric railway system with the chief towns and villages of the county, and with a number of places along the coast. The land-locked harbor, six miles along the southern front of the city, can accommodate the largest ocean vessels. The city has 15 miles of water-frontage. The jetties erected by the Federal Government in the western part of the harbor have greatly increased traffic. The high-tide jetties, forming the harbor entrance, are built of rubble stone. The South Pacific Coast Railway has built a solid mole alongside the south jetty.

Oakland is walled on the north and east by the Coast Range, and the city slopes down to the bay, making a location of great scenic beauty, forming an almost perfect natural drainage, and so protecting the city from cold but not cool breezes as to give an ideal climate. The mean temperature for the years 1880 to 1904, was 52° F. It was settled in 1820 by Don Luis Maria Peralta and other Spaniards, was incorporated in 1852, and chartered as a city in 1854. It is the commercial centre of a large agricultural region, and its excellent facilities for transportation (ships and cars meet at the waterside) are greatly increasing the amount of its shipments each year. Its chief industrial wealth is derived from its manufactures, shipping, and the agricultural products of the county. The principal industrial establishments are iron works, which have 800 employees; ship-

building works, 700 employees; canneries, over 4,000; flour mills, 150; candy factories, 200; gas works, 250; planing mills, 650; and lumber yards, 375. There are in the employ of building contractors over 2,000 men; the paving companies have about 350 employees; the coal and grain handlers number about 175, and the water company has 250 employees, the street railroads, 900; and other industries of the city have in all 17,941 employees. The annual wages paid to the employees of industrial establishments is about $10,302,000. Some of the prominent buildings are the post-office, banks, hospitals, Home for the Blind, Y. M. C. A. and Y. W. C. A. buildings, theatre, Saint Joseph's Home for Deaf Mutes, the church, school, and library buildings. The educational institutions are 19 public and 10 parish schools, California College (Baptist), Saint Mary's College (R.C.), Saint Joseph's Academy (R.C.), Our Lady of Lourdes Academy (R.C.), a public library which contains nearly 40,000 volumes and is housed in a Carnegie building which cost $50,000, on a site that cost $20,000. Connected with the public high school is a well equipped observatory. Berkeley (q.v.), which is the seat of the University of California, adjoins Oakland, on the north. There are eight public parks, and a water park in which at the base of the foothills and within 10 minutes' walk of the centre of the city is Lake Merritt, a natural salt-water lake of 170 acres, whose waters are replenished with every tide. The nine banks have (1903) a combined capital of $2,750,000; the deposits amount to $22,385,143.06. The government is vested in a mayor and a council of 11 members, who hold office two years. Berkeley on the north, Almeda on the southwest, and a number of smaller adjoining places are practically one with Oakland commercially and industrially, but each has a separate municipality. Pop. (1880) 34,555; (1890) 48,682; (1900) 66,960.

EDWIN STANTON,
Secretary Oakland Board of Trade.

Oak'um, in shipbuilding, threads of hempen ropes picked to pieces, to be used when mixed with pitch for calking the seams of wooden vessels. Until recently old men, women, and children were employed to pick oakum, but this is now chiefly done by machinery. The rope or junk is old rigging and cables bought up for this purpose. It is first cut by a powerful knife into short lengths, and these are thoroughly steamed to dissolve out the tar. The strands being then pulled apart, they are spread in the sun to dry. After this they are torn in pieces and cleaned of dust in carding machines, a succession of which are used, until the oakum is obtained in clean light fibres. Since the passing of the wooden ship, oakum is very little in demand.

Oannes, ō-ăn'nēz, in Babylonian mythology, a god of the sea, described as having the head and body of a fish, to which were added a human head and feet. In the daytime he lived with men to instruct them in the arts and sciences, but at night retired to the ocean.

Oar Fish, or **Band-fish,** one of the ribbon-fishes (*Regalecus banksii*), a peculiar deep-sea fish, 12 to 20 feet or more in length, with a narrow and extremely compressed body of a silvery color. It is only rarely met with and usually in a dying condition, as its proper home is in the depths of the sea.

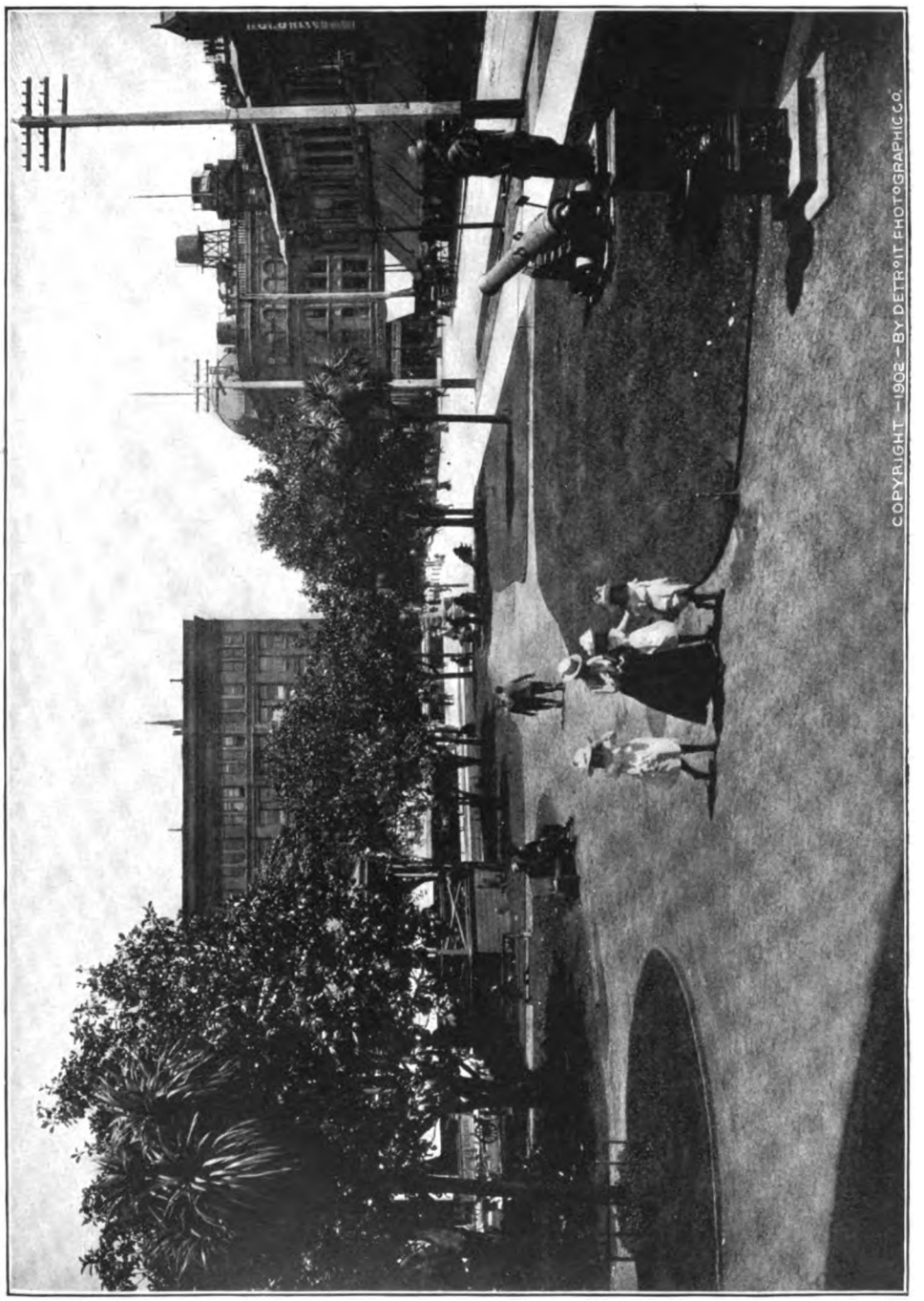
Oás, ō-äs', Philippines, a pueblo of the province of Albay, Luzon, situated in the Inaya River, 15 miles northwest of Albay, the provincial capital. It is on the main road between Ligao and Polangui, has a considerable river trade, and is the centre of one of the finest hemp-growing districts of the province. Pop. 15,987.

Oa'sis, a fertile place in a desert, usually found where lack of vegetation is caused by lack of moisture. Some of the mountains in the Sahara are of sufficient height to cause condensation of moisture and rainfall; and as much of the soil has all the ingredients necessary for productiveness, an oasis is formed. Springs sending out enough water to moisten the soil aid in the formation of fertile spots; and artificial means are now used; the artesian wells are assisting in making productive places in the Sahara. See SAHARA.

Oat Grass. See GRASSES OF THE UNITED STATES.

Oates, ōts, **Titus,** notorious English perjurer, the fabricator of the story of the Popish Plot: b. Oakham 1649; d. London 12 July 1705. The son of a clergyman of the Church of England who had become an Anabaptist preacher and in 1654 was expelled from a chaplaincy in the Parliamentary army, he was turned out of successive schools and took no degree at Cambridge, but was ordained and became vicar of Babbing in 1673. Soon after he was vicar to his father, with whom he circulated such outrageous stories against a schoolmaster of the parish that they were expelled from the living. After various ups and downs, about 1676 he conceived the idea of informing against the Roman Catholics; he became a Roman Catholic in 1677, studied at Valladolid and St. Omer, but was expelled from both, and 1678 gave information as to a Popery Plot against Charles II., intended to seat upon the throne James, Duke of York, and turn the country over to the Jesuits. He received a large governmental pension and his story was implicitly believed, resulting in the judicial murder of 35 innocent persons. But in two years the excitement somewhat subsided; and upon the accession of James II., Oates' pension was withdrawn and he was put on trial for perjury, was found guilty, fined, condemned to stand in a pillory, and be imprisoned for life after a terrible flogging, which he survived as by a miracle. His sentence was reversed after the accession of William and Mary; he was set free and received an annual pension of £300. In 1693 he married a rich widow and a few years later joined the Baptist congregation and preached among them, but was soon expelled. Consult: Roger North, 'Examen,' and 'Lives of the Norths'; Thomas Seccombe, 'Lives of Twelve Bad Men' (1894); Burnet, 'History of My Own Time' (1883); and the English histories of Hallam, Lingard, and Macaulay.

Oaths and Affirmations (Judicial). A judicial oath is a solemn declaration made in some form waranted by law, before a court of justice or some officer authorized to administer it, by which the person taking it promises to tell the truth, the whole truth and nothing but the truth, in relation to his knowledge as to the matter then under consideration, and appeals to God to wit-



CITY HALL SQUARE.

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ness his sincerity. It is distinguished from an extra-judicial oath in the fact that the latter is not made under any warranted form of law, and has no binding force, except in the conscience of the one taking the oath. An affirmation is made in place of an oath by a person conscientiously opposed to an oath, and it is a declaration which is equivalent in law to an oath. Oaths are of extremely ancient origin, and are not peculiar to Christianity, having been used by nearly all nations in the world. Affirmations in place of oaths were the result of a statute first enacted in England for the benefit of those to whom the invocation of the Deity was objectionable. Generally under the present laws, only those persons included within the statutes permitting an affirmation to be made in place of an oath, have such right. Authority to administer oaths is an incident to judicial officers. All persons having sufficient intelligence to appreciate the nature of an oath and believing in the existence of a Supreme Being, who demands a moral obligation to speak the truth when under oath, are competent to take an oath.

In nearly all of the United States, through statutory enactment, it is provided that every person believing in a religion, not the Christian religion, may be sworn according to such ceremonies as his religion may have; a substantial compliance with the provisions of the statute as to the form of an oath is usually sufficient, the test generally being as to whether or not the person taking the oath would be liable for punishment for perjury in the event that such oath had been violated. Any person lawfully required to depose the truth, and making a wilful false oath on any material point, whether he believes it or not, is subject to be held for perjury, and punishment therefor in accordance with the statutes under which he may be indicted. See also Evidence; Law, Criminal; Witness.

Oats, various grasses of the genus *Avena*. The best known species is often subdivided into Tartarian oats (*A. orientalis*) and common oats (*A. sativa*). In the former variety the panicles are one-sided and somewhat contracted; in the latter they are loose and spreading. The origin of common oats is in doubt, but many writers suppose that they are derived without hybridizing from a Tartarian species now unknown to botanists. The numerous varieties of this species vary greatly in color, size of grain, height, etc., and more or less in composition. Other species are cultivated to a small extent but are mostly considered weeds. The best known of these are probably animated oats (*A. sterilis*) whose seeds move with varying amounts of moisture; wild oats (*A. fatua*) valued in some places, for example, California, for pasturage, but generally regarded as a noxious weed; bristle-pointed oats (*A. strigosa*) used sometimes like the preceding but also considered a weed; and short oats (*A. brevis*) cultivated at high altitudes for its seed which matures where other cereals fail.

Oats succeed well upon a great variety of soils if these are well supplied with moisture. They will not do well in wet soil nor in hot countries, though in warm regions they succeed if the soil is moist enough. They thrive best in temperate climates, in many of which they rank as one of the most important cereal crops. The land is plowed and harrowed usually in spring and the seed either sown broadcast or drilled in at the rate of about three bushels to the acre. In the western United States the seed is commonly sown broadcast upon corn-land which has been prepared only with the harrow. In the eastern States the ground is usually plowed previous to sowing. Since the plants are very hardy the seed may be sown as soon as the ground can be worked in spring, a practice which insures an early development of the plants under favorable conditions. In about three months the harvest usually occurs in northern countries; in southern regions a somewhat longer time is necessary because of the shorter days and usually drier conditions. Though the average yield per acre in the United States was, during the last decade of the 19th century, 26.14 bushels, yields of more than 50 bushels are common under good management, especially in Europe.

Oats are rather exempt from the attacks of specific insect enemies; and the means of combating the general cereal enemies are the same as for wheat, barley and other grass and grain insects. They are subject to the attacks of several so-called plant diseases, of which the best known are rust and smut. Since these are less troublesome upon early maturing varieties, these are chosen in regions which seem to be infested. They also have another advantage in that they are less likely to lodge than taller and later growing varieties.

The oat has long been considered one of the most valuable of cereal grains. Treated as a grass it makes an excellent forage, fodder or hay; and as a grain it is one of the standard feeds for domestic animals, particularly the horse, and is widely used as human food, especially for making porridge. In the manufacture of what are called "breakfast foods" the oat takes an important part, and the by-products, such as hulls (the outer covering), bran, middlings, and "oat dust" are largely sold to stockmen for mixing with other feeds. The whole grain has the following average composition: Nitrogen-free extract, 59.7; protein, 11.8; water, 11.0; crude fibre, 9.5; fat, 5.0; ash, 3.0. Since analyses have failed to reveal the presence of a supposedly stimulating principle called "avenin," chemists and other investigators have concluded that such a principle does not exist.

Consult Morrow and Hunt, 'Soils and Crops of the Farm' (1892), and books upon general farming.

Oaxaca, wā-hā'kā, **Oaxaca de Juarez**, dā hoo-ä'rĕth, or **Oajaca**, Mexico, a maritime state, bordering on the Pacific Ocean, and bounded on the north, east, and west by the states of Puebla, Vera Cruz, Chiapas, and Guerrero. Area about 28,778 square miles. The principal mountain ranges are the Sierra Madre, which crosses the whole state, and Sierra del Sur, near the coast. Of its ports, the most important are Salina Cruz and Puerto Angel. Minerals found are: silver, gold, iron, lead, coal, marble, and salt. Among its agricultural products are cereals, sugarcane, cotton, coffee, and tobacco; the annual value of the crops being about $15,000,000. The Southern Mexican railroad runs from Puebla to Oaxaca on its way to the Guatemalan frontier, with a branch to Puerto Angel. The starting point of the railway which is to connect the Pacific Ocean and the Gulf of Mexico is Salina Cruz. Communication with the adjacent states is maintained by means of

highways, telegraph, telephone, and mail routes. The ports of Salina Cruz and Puerto Angel are visited by vessels of the Pacific Mail Steamship Company, the Hamburg-American line, and a Mexican line. Population of the state 884,909. The capital and chief town, also called Oaxaca, which has 32,437 inhabitants, is one of the handsomest cities in the republic, containing fine public buildings, a good public library, cathedral, etc. Historically, the place is interesting from its association with the leading characters in the Mexican annals, beginning with Cortés. It was injured by earthquakes in 1787 and 1801. In 1812 it was captured by Morelos. Diaz surrendered it to Bazaine in 1865, and recovered it 1 Nov. 1866. Gen. Fidencio Hernandez, after taking the city in 1876, proclaimed himself governor of Oaxaca, and Porfirio Diaz, general-in-chief of the revolutionary army. The antiquities of the state of Oaxaca reveal an advanced and somewhat mixed culture in this part of the ancient Nahuan-Zapotecan province, formerly the home of Miztecs, Zapotecs, and other tribes. The finest group of ruins is that at Mitla, about 38 miles southeast of the capital; "Mitla," however, is not the original name, but an Aztec word, signifying "dwelling of the dead," or "hell." Zachila, nearer to Oaxaca city, was the site of the Zapotec capital. The ruins of Monte Alban were explored by Garcia in 1855, by the German traveler Müller in 1857, and by Charnay in 1858–59. Near Tehuantepec are remains of fortifications built by Zapotecs to resist the advance of Aztec forces. At Chiputlan is a cyclopean bridge of aboriginal construction.

MARRION WILCOX,
Authority on Latin America.

Ob, ōb, or **Obi,** ō'bē, Siberia, a great western river with its head-streams, the Biya and the Katun rising in the Altai Mountains within the frontiers of the Chinese dominions. The river flows northwest and north for 2,120 miles to the Arctic Ocean, which it enters by three mouths at the great Gulf of Ob, an inlet of the Kara Sea, between Nova Zembla and the mainland; the gulf of irregular form extends between lat. 64° 30′ and 72° N., and lon. 68° and 77° E., and is ice-bound from October to June. The chief tributaries of the Ob are the Irtish, Tcharysh, Tom, and Tchulym, all navigable. On the banks of the Ob are the towns of Barnaul, Tomsk, and Tarym. At present only a few steamers ply on the great water-system of the Ob, of which over 9,000 miles are navigable, but its commercial importance is increasing. The accessibility of this great Siberian navigation system to West European commerce during the summer months was demonstrated as early as 1874 and subsequently by the voyages of Captain Wiggins from Dundee, Scotland, through the Kara Sea to the Gulf of Ob.

Obadiah, ō-ba-dī'a or ŏb-a-dī'a ("the Servant of God"), one of the minor prophets. His date may be gathered from the fact that in his brief prophecy he rebukes the Edomites for exulting over the destruction of Jerusalem by Nebuchadrezzar, which took place 587 B.C. Nothing else is known about this prophet.

The Prophecy.— A single chapter contains the whole utterance of Obadiah, which is yet of lyrical point and symmetry. It consists of two parts; the first (ver. 1–9) foretells the destruction of Edom. The rocky strongholds of Esau's progeny, their noted sagacity and wisdom, even the number of their allies will avail nothing to help them. The second part (ver. 10–21) gives the reason of this sudden judgment, namely Edom's cruelty to Israel. The prophet earnestly warns them to cease from this unfeeling persecution; urging upon them the fact that Jehovah's punishment on all nations is at hand. When the day of wrath comes, Judah shall be united with Joseph, bring Edom to destruction and regain possession of its hereditary domain.

Character and Style.—The diction of the prophecy is terse energetic, but of the severest plainness, and this brief and direct utterance seems in harmony with the single purpose of the prophet which recalls Nahum's unity of design and subject. Consult: Perowne, 'Obadiah and Jonah' in the Cambridge Bible for Schools and Colleges (1882); Caspari, 'Der Prophet Obadja ausgelegt' (1842); Peters, 'Die Prophezeiung Obadias' (1892).

Oban, ō'ban, Scotland, a fashionable watering place of Argyllshire, on the beautiful and almost landlocked bay of Oban, 92 miles northwest of Glasgow, and 136 miles from Edinburgh. It is the great tourist headquarters of the West Highlands, with about 30 hotels, and splendid steamboat facilities, and its spacious lake-like haven is crowded in summer by yachts and steamers. In the vicinity are the picturesque ruins of Dunollie and Dunstaffnage castles, and a prehistoric cave-dwelling discovered in 1890. Permanent pop. (1901) 5,374.

Obando, José María, hō-sā' mā-rē'ā ō-bän'dō, Colombian soldier and politician: b. Garcia 1797; d. Cruz Verde 29 April 1861. He served for several years in the Spanish army, joined the patriots in 1882, defeated the dictator Urdaneta 1831, and established a constitutional government, the republic of New Granada, of which he was vice-president 1831–2, secretary of war 1832–7, and, after his return from exile consequent upon the unsuccessful rising against Marquez, president 1853. In 1854 he was proclaimed dictator, but his army was beaten. In 1861 having joined the Federalist revolution he was assassinated by a personal enemy.

O'beah. See FETISH; OBI.

Obeid, El, ĕl ō-bā'ēd or ō-bād', Egyptian Sudan, a town, capital of Kordofan, 220 miles southwest of Khartum. It consists of a number of villages, originally separate and inhabited by distinct races, but now united in one town. Gum-arabic, ivory, gold, and ostrich feathers are the chief articles of trade. Near this place, in 1883, a force of Egyptians under Hicks Pasha, with a British staff, was exterminated by a large army of the Mahdi. Pop. (est.) 35,000.

Ob'elisk (Greek, *obelos* and *obeliskos,* both literally signifying a spit or pointed instrument of any kind, and hence a pointed pillar). Obelisks belong to the oldest and most simple monuments of Egyptian architecture, and are high four-sided pillars, diminishing as they ascend, and terminating in a small pyramid called the pyramidion or cap. They seem to have been peculiar to Egypt, and although two structures resembling obelisks, and the apex of a third, have been discovered in Assyria, these differ from the true Egyptian obelisk in this respect, that their summits, instead of being of a pyramidal form, are

step-shaped. The obelisks of ancient Rome were not the work of Roman hands, but were brought there from Egypt at great expense. In more recent times several other obelisks have been brought from Egypt to adorn other European capitals. They are all monoliths, and vary in height from a few inches to above 100 feet. They are mostly of red granite, or rather syenite, from the quarry of Syene in Upper Egypt. For the most part they bear hieroglyphical inscriptions recording the names and exploits of Egyptian kings, whence they are called in Coptic by a name signifying "written columns." Those which are without such inscriptions may probably be regarded as unfinished. The sides of some of the obelisks are slightly convex, the intention of which is to obviate the effect of the play of light on polished granite surfaces in making them appear concave. An obelisk still lying in an unfinished state in the quarry of Syene shows the way in which they were made. The obelisk was cut out in the solid rock, and polished on three sides before the fourth side was disengaged. A deep fissure was then made along the under side where the separation was to be made, and wooden wedges introduced into it, which, being frequently moistened, expanded and gradually effected the separation without any shock. When thus disengaged from the quarry the obelisks were conveyed on rafts to their destination during the inundations of the Nile, or where this means did not serve, were laid on a rude kind of carriage made of logs, and dragged over the ground by long trains of men or animals. On reaching the place where they were to be erected the sculptors set to work to engrave on them the inscriptions they were intended to bear. The inscriptions are read perpendicularly. Sometimes there is only one, and sometimes more than one column of inscriptions on each side. The engraving being finished, the obelisks were erected on their pedestals, which are quadrangular blocks of stone of considerably larger area than the base of the obelisk.

The first obelisk is said to have been erected by Rameses, king of Egypt, in the time of the Trojan war; it was 40 cubits high, and employed 20,000 men in building. There are about a dozen Egyptian obelisks erected in Rome. One was erected by the Emperor Augustus in the Campus Martius, on the pavement of which was a horizontal dial that marked the hour, about 14 B.C. Of the obelisks brought to Rome by the emperors, several have been restored and set up by various popes. The largest is that from Heliopolis. It is of granite, and now stands before the portico of the Church of Saint John Lateran, where it was erected in 1588. Its whole height is about 149 feet; without the base, 105 feet. It was removed to Alexandria by Constantine, and to Rome by his son Constantius, and placed in the Circus Maximus. The obelisk at Luxor was presented to the French nation in 1820 by Mehemet Ali, and was re-erected in Paris in 1833. Its height is 75 feet. The obelisk presented to the English nation was removed to England and set up on the Thames embankment in London. It is 68 feet 5½ inches in height, with a width at the base of 7 feet 10½ inches by 7 feet 5 inches. Of Egyptian obelisks 42 are known. One of the best known of these is one in Central Park, New York, removed from Alexandria in 1880. For details concerning this obelisk see the article CLEOPATRA'S NEEDLE.

The Washington Monument (q.v.) or obelisk at Washington is 555 feet high, and was dedicated 22 Feb. 1885. The Bunker Hill Monument (q.v.) in Boston may also be properly called an obelisk, and that with the Washington are the two most famous of American construction. The battle to commemorate which the Boston monument was erected took place 17 June 1775. Just 50 years later the Marquis de Lafayette laid its cornerstone. It is 30 feet square at base and 231 feet high. It was dedicated in 1843. See also STANDING STONES.

Ober, ō'bėr, **Frederick Albion,** American author: b. Beverly, Mass., 13 Feb. 1849. He was educated in the public schools and made a study of ornithology, traveling extensively in the pursuit of his studies and has discovered 22 new species of birds. He has written: 'Camps in the Caribbees' (1880); 'Travels in Mexico' (1883); 'Montezuma's Gold Mines' (1885); 'Under the Cuban Flag' (1896); 'A Brief History of Spain' (1899); 'The Last of the Arawaks' (1901); 'Two Boys with Columbus' (1903); etc.

Oberammergau, ō'bĕr-ăm"mĕr-gow, Bavaria. See AMMERGAU; PASSION PLAY.

Oberhausen, ō'bĕr-how-zĕn, Germany, a town of Rhenish Prussia, in the Rhine Valley, a few miles northeast of Duisburg, an important railway centre and seat of industry, having blast-furnaces, rolling-mills, forges, etc., and productive coal mines. Pop. (1900) 42,148.

Oberholtzer, ō'bėr-holt-sėr, **Ellis Paxon,** American journalist; son of Mrs. S. L. Oberholtzer (q.v.): b. Philadelphia 1868. He was educated at the University of Pennsylvania, was on the editorial staff of the Philadelphia *Evening Telegraph* 1889–96; editor of 'The Manufacturer' (1896–1900), and has been literary and dramatic editor of the Philadelphia *Public Ledger* from 1902. He has published: 'The Referendum in America' (1893); 'Die Beziehung zwischen dem Staat und der Zeitungspresse' (1895); 'The New Man' (1897).

Oberholtzer, Sara Louisa Vickers, American author: b. Uwchland, Pa., 2 May 1841. She was educated in the Millersville Normal School and in 1862 was married to John Oberholtzer. She is an authority on school savings banks and on economics. Her publications include: 'Violet Lee and Other Poems' (1873); 'Hope's Heart Bells' (1884); 'Souvenirs of Occasions' (1892); etc.

Oberländer, ō'bėr-lān-dėr, **Adolf,** German artist: b. Regensburg 1 Oct. 1845. In 1861 he entered the Munich Art Academy and later became a pupil of Pilotys, making brilliant progress under the instruction of that master. He found that historical painting did not suit his particular talent which he early revealed in a humorous cartoon published in 'Fliegende Blätter' (1863). He subsequently abandoned painting and devoted his entire time to humorous and satirical designs, which showed such striking virtuosity that he became the leading artist on the staff of 'Fliegende Blätter.' He is strong as a caricaturist, and exquisitely delicate as a draughtsman, and his use of satire and ridicule is good-natured and avoids the coarseness

and brutality sometimes too apparent in the pages of the comic papers. The majority of his cartoons have been collected and published in the 'Oberländer Album.'

Oberlin, Jean Frédéric, zhŏñ frā-dā-rēk ō-bĕr-lăñ, Alsatian clergyman and philanthropist: b. Strasburg 31 Aug. 1740; d. Ban-de-la-Roche 1 June 1826. He was educated at Strasburg and in 1767 became pastor at Ban-de-la-Roche. There he spent the rest of his long life in labor for the material and spiritual improvement of his degraded parishioners. He practised medicine among them, founded a loan and savings bank, introduced cotton manufacture, helped the people build better roads, and brought in modern agricultural methods. His orphan asylums were the beginning of the many "Oberlinvereine" for the protection of children. Beside all this he was a man of rare spirituality, being frequently styled "a saint of the Protestant church," and an excellent pastor, who preached three Sundays each month in French and one in German. Oberlin College (q.v.), Ohio, was named in his honor. Consult the biographies by Butler (English, 1882); Lutteroth (French, 1826; a German version, 1890); and Hackenschmidt (German, 1902); and the life and works of Oberlin as edited by Hilpert and Stoeber (German, 1843).

Oberlin, ō'bĕr-lĭn, Ohio, town in Lorain County; on the Lake Shore & M. S. railroad; about 30 miles west by south of Cleveland. It was settled in 1833 as a college town, and Oberlin College was founded the same year; it was incorporated in 1846. It is in a fertile agricultural region; and its industries are chiefly connected with the farm products; but it has continued as an educational centre. Besides the college there are business schools and well organized system of public schools. Connected with the kindergarten system is an excellent training class. Pop. (1890) 4,376; (1900) 4,082.

Oberlin College, at Oberlin, Ohio; coeducational, founded in 1833 under the name Oberlin Collegiate Institute. In 1850 the name was changed to Oberlin College. The preparatory was the first department opened, but within two years the collegiate department and the theological school were organized and in operation. It was among the first colleges in the United States to adopt coeducation, and to admit colored students. Oberlin College was a noted centre from which emanated strong anti-slavery sentiments, and in the vicinity was the "Underground Railroad" (q.v.) so much used in slavery days by the Abolitionists (q.v.). There are departments of music and art, courses in physical training for women, and summer school courses. In 1903 there were connected with the college 84 professors and instructors and about 1,500 students, nearly 1,000 of whom were women. The library (1904) contains about 70,000 bound volumes and 100,000 pamphlets. The grounds and buildings are valued at $660,000; the scientific apparatus, etc., $51,000; and the productive fund is $1,068,800. The annual income from tuitions and fees, is about $90,000, from the productive funds, $50,000. In 1901 the benefactions were $154,700, and the total income from all sources for the same year was $210,143.

Oberon, ō'bĕ-rŏn, in mediæval mythology, the king of all the fairies and husband of Titania. Oberon is said to be derived originally from the Scandinavian. He has been repeatedly adapted to romance, poetry and the opera.

Obesity, an abnormal state of nutrition characterized by an undue deposition of adipose tissue beneath the skin and within the tissues and organs of the body. In states of health the body is more or less covered with a layer of fat, which ordinarily increases and decreases as the state of nutrition varies. Obesity becomes a disease when the increase of adipose tissue constitutes an unwholesome or morbid state leading to interference with the functions of the body in its various parts. The condition may be inherited or acquired. The inciting cause of most but by no means of all cases of obesity is the ingestion of more food than is required by the body. This is particularly true of the foods that are readily converted into adipose tissue — the carbohydrates (starches and sugars), fat, and alcohol. Mental labor consumes comparatively little of these elements, and in those who lead sedentary lives or are naturally indolent these substances, unless sparingly indulged in, are not oxidized and cause the fatty accumulations. There is also an interrelation between the sexual life and obesity, as seen at the time of puberty and at the menopause in many women, and by the deposition of fat in animals after castration. In ordinary cases of obesity the fat accumulates in the form of tiny droplets between the tissue-elements; in fatty degeneration the tissue elements are changed into fat. Fatty degeneration is found in the organs of those not afflicted with obesity, but in the late stages of the disease under consideration this very serious morbid change may come about.

Two chief classes of the obese are commonly observed, the plethoric and the anæmic. In the plethoric type there is a general over-nutrition; the muscles are large and well developed; the blood is very rich in hæmoglobin. The heart enlarges, and at first acts vigorously, but sooner or later there is a weakening of the heart-muscle, changes in the blood-vessels begin, and there may be changes in the liver and kidneys, interfering with their functions. Sudden death from "heart-failure" and apoplexy are common to these cases. In the anæmic type there is general flabbiness of the muscles and impoverishment of blood. Individuals thus affected are troubled with an incapacity for exertion, palpitation of the heart, and shortness of breath. They are not excessive eaters, nor always great drinkers. The tendency to obesity is maintained and increased by the deficiency of hæmoglobin and consequent lack of oxygenation of the tissues. This class of obesity is much more serious than the plethoric, whose subjects may remain in a condition of comparative health for years, in spite of their adiposity.

Obese persons bear disease and accidents badly, and if their body weight is in undue proportion to the height they are recognized as undesirable risks for life insurance on the ordinary terms.

The underlying causes of these disturbances in metabolism are not always clear; while the excess of food consumed to the amount used in physical and mental labor is frequently accountable for the trouble, there is in many instances an undiscovered factor. It is possible that de-

ficiencies in the internal secretions from the thyroid and other glands may be in some way connected with the trouble. In myxœdema (q.v.) there is a disorderly deposit of fat through the body, and this disease is apparently due to atrophy of the thyroid gland. Moreover the gland extract has been responsible for a decided diminution of adipose tissue. This is the only treatment with medication that is of any value, reliance usually being placed on dietetic and hygienic measures with success in a large proportion of cases.

Various plans of diet have received their originators' names. Among the first was that practised by William Banting (q.v.) on himself at the advice of Harvey. According to "Bantingism," the patient partakes of only 20 ounces of dry food in 24 hours and over half of this allowance is meat, while the fluid is reduced to 35 ounces. This plan, while it removes the food most likely to form fat, gives to the individual a large amount of nitrogenous matter difficult of digestion and assimilation, and deprives the body of heat-producing substances. Furthermore, the normal fat-supply of the brain is seriously reduced. A small proportion both of fat and carbohydrate must be combined with nitrogenous matter in order to insure normal metabolism.

The Ebstein treatment recognizes the fact that fat is more easily disposed of in the body than starches and sugars, and that meat substances may be converted into fatty tissue when in excess. He therefore allows some fat, a moderate amount of meat, and almost entirely eliminates carbohydrates from the dietary. He also greatly restricts water and forbids alcohol. An ordinary diet-list made up according to this system is as follows: Breakfast, tea without sugar, and dry buttered toast; dinner, meat soup or roasted fat meat with fat gravy, one or two fresh vegetables in moderation, salads, and dried fruits; supper, an egg, moderate allowance of ham or fat meat, and an ounce of thin well-buttered toast or dry bread.

The Oertel plan is much like the Ebstein, but the fats are not so freely given, and the carbohydrates not so sparingly. Great reliance is placed on graduated exercise to strengthen the heart's action, and thus the condition of the patient is improved and the fat oxidated. Patients under his care are made to climb carefully graded mountain paths for specified distances, which increase as the heart becomes stronger. Patients showing respiratory embarrassment are allowed only about 25 grams of fat, 90 grams of carbohydrate, and 150 grams of proteid; those showing no respiratory embarrassment are allowed less proteid and more fat and carbohydrate.

The table prepared by Yeo contrasts these dietaries with the normal average:

	Albuminates grams	Fats grams	Carbohydrates grams
Normal average	130	84	404
Banting	170	10	80
Ebstein	100	85	50
Oertel	155-179	25-40	70-110

Schweinger's system is practically the same as Oertel's, differing in withholding all fluid until two hours after meals, allowing very little then. Germain See allows a diet of proteid and fat, and requires his patients to take large amounts of fluid. This plan seems to be well suited to individuals afflicted with gout and rheumatism. Others rely on rest and passive exercise, in the form of Swedish movements, etc., with a skimmed-milk dietary gradually replacing the ordinary food until the skimmed milk becomes the only article allowed. The patient is confined to a single room and for 10 days is allowed to walk but little. Careful watch must be kept that the patient's strength be not overtaxed.

Of these treatments that of Oertel is best adapted to the majority of patients. After treatment is discontinued they evince less disposition again to put on fat, because of the improved oxygenating powers of the blood. The anæmic obese are less benefited than other types, but much can be done for them if the disease has not progressed too far. See CORPULENCE.

Obi, ō'bē, a river in Siberia. See OB.

Obi, ō'bĭ, **Obe,** or **Obeah,** a species of witchcraft practised among the native African and the West Indian negroes. The law of Jamaica, enacted in 1760, which prohibited under severe penalties the practice of obi, enumerates among the materials used for fetishes or spells, blood, feathers, parrots' beaks, dogs' teeth, alligators' teeth, broken bottles, grave dirt, rum, and egg shells. Balls of earth or clay mixed with hair, rags, or feathers, and bound with twine, or in some cases blended with the upper section of the skulls of cats, or stuck round with cats' teeth and claws, or with human or dogs' teeth, and with glass beads, were also used. In 1762 the influence of the obi men produced a formidable insurrection among the slaves in Jamaica, and several of these sorcerers were hanged by the authorities. See FETISH; WITCHCRAFT.

Obit, ō'bĭt or ŏb'ĭt (Lat. *obitus,* decease), the service in the church at the solemn interment of the dead; in the Roman Catholic Church an annual religious service, founded for celebrating the memory of a deceased person, and for the expense of which an endowment was left in many European countries. It is also called an annual, or a year's memory. The institution of obits is said to be an ancient one in the church. It is attributed to the practice in the primitive church of commemorating the martyrs, on the anniversary of their deaths. During the period of prosperity following the persecutions similar commemorations were extended to benefactors of the church, and to private individuals by friends and relatives. A like institution, called the commendation of benefactors, is observed in the English universities.

Ob'ject-glass, or **Objective.** See LENS; MICROSCOPE; TELESCOPE.

Object, Philosophical. See METAPHYSICS.

Object Teaching, a modern name given to a revived method of teaching the young by using objects. The history of educational methods shows that "object teaching" antedates the use of books, as would naturally be inferred from the modernity of the printed and popular book. Books telling about objects — explaining the laws of nature and describing experiments made by scientists — replaced in many schools of the world the observation work which had been done earlier, and which is recognized as neces-

sary for the proper development of the young. A study of the methods used by the teachers mentioned in Old and New Testaments shows that the thing was studied as they learned about "the beginning and ending and midst of the times, the alterations of their courses, and the changes of the seasons, the revolutions of the year and the dispositions of the stars; the nature of living creatures and rage of wild beasts, the force of winds and reasoning of men, the diversities of plants, and the virtues of roots." The leaders among educators always taught that "the concrete should precede the abstract," that observation, thought, and expression are essential for individual development, and that the learner must see, hear, feel, and exercise his senses in order to learn. Comenius (q.v.) said: "Let the senses be applied to the subject as often as possible." Pestalozzi (q.v.) introduced into modern primary teaching a systematized method of using objects for the cultivation of the powers of observation of the young, but not aiming to stop at observation. Froebel (q.v.) and Rosmini (q.v.) contributed valuable information on the subject, the former living long enough to give the world a famous educational system. Comenius is credited with aiding "object teaching" by giving, in his 'Orbis Pictus,' the first school picture book for the young; but a picture book cannot take the place of natural objects, although it does aid in the verification stage of the work. Object teaching as introduced into the schools of the United States has been replaced by Nature Study (q.v.), and incorporated into the work in the natural sciences, drawing, and manual training. Consult: Sheldon, 'Object Lessons'; Calkins, 'Manual of Object Teaching'; Barnard, 'Object Teaching'; Ricks, 'Object Lessons.'

Oblates. See ORDERS, RELIGIOUS.

Oboe, ō'bō-ĕ, an Italian musical wind instrument resembling a clarinet in shape, and sounded through a double reed. It consists of three joints besides the mouthpiece, and like many other wind instruments, produces a series of overtones.

Ob'olus, a Greek coin of silver or copper, the sixth part of a drachm, about 21 cents in value.

Obongo, ō-bŏng'gō, or **Abongo,** a tribe of pigmies who live in different parts of French Kongo in West Africa. See PIGMIES.

Obrenovitch, ō-brĕn'ō-vĭch, Servian princely family, rivals of the Karageorgevitches, who hold the throne since the assassination of Alexander I. (q.v.). See SERVIA.

O'Brien, ō-brī'ĕn, **Cornelius,** Canadian Roman Catholic archbishop: b. New Glasgow, P. E. I., 4 May 1843. He was educated at Saint Dunstan's College, Charlottetown, P. E. I., and at the Propaganda College in Rome, and was for some time professor in Saint Dunstan's College and rector of Saint Dunstan's Cathedral. In 1882 he was consecrated archbishop of Halifax. Among his published works are: 'After Weary Years,' a novel; 'Aminta,' a book of dramatic verse; etc.

O'Brien, Fitz-James, Irish-American journalist and poet: b. Limerick, Ireland, 1828; d. Cumberland, Md., 6 April 1862. After study at Dublin University, he went to London, where he soon got rid of a fortune, and in 1852 came to the United States. He wrote for Brougham's 'Lantern' and became also one of the valued contributors to Harper's 'Monthly' and 'Weekly.' His imaginative short stories, 'The Diamond Lens' and 'The Wondersmith,' first printed in the 'Atlantic,' were of a series notable for originality and effective ingenuity. In 1861 he entered the 7th New York Regiment, and was sent to the defenses of Washington. Later he was appointed to the staff of General F. W. Lander, won praise from McClellan, and on 26 Feb. 1862 received in a skirmish the wound from which he died. He was a true, if a minor, poet, and wrote some very striking prose fiction. William Winter, poet and critic, collected his most worthy work (1881).

O'Brien, Jeremiah, American patriot: b. Scarborough, Maine, 1740; d. Machias, Maine, 5 Oct. 1818. He was in the lumber business at Machias at the outbreak of the Revolution. Shortly after Lexington, the British cruiser Margaretta appeared in Machias harbor, seeking lumber for the defenses at Boston. Sixty volunteers soon set out in a lumber-sloop, under the leadership of O'Brien, to capture the British vessel. In the following hand-to-hand encounter, the first sea-fight of the war, they were completely victorious. The sloop took on board the Margaretta's armament, and renamed the Machias Liberty, coasted about, with O'Brien as captain, for 18 months, and took several prizes. O'Brien was later in command of the privateer Hannibal, was captured, and was for some months imprisoned in the Mill prison, England, but made his escape.

O'Brien, Lucius Richard, Canadian painter: b. Shanty Bay, Ontario, 15 Aug. 1832. He began life as an architect and civil engineer and spent much time sketching in the open air as an amateur. In 1872 he joined the Ontario Society of Artists; in 1880 was appointed president of the Royal Canadian Academy of Art, and in 1895 president of the newly formed Provincial Guild of Sculpture. He is preeminently a portrayer of Canadian scenery and the two pictures of Quebec which he painted by order of Queen Victoria, his views of the Rocky Mountains and Selkirk Range, and his 'Sunrise on the Saguenay' (Art Gallery, Ottawa) are the most characteristic of his works.

O'Brien, Richard Barry, Irish author: b. Kilrush, County Clare, Ireland, 1847. He was educated at the Catholic University, Dublin, was admitted to the Irish bar in 1874 and to the English bar the next year, and after practising his profession for a short time in England turned his attention to politics and writing. He has published 'The Irish Land Question and English Public Opinion' (1879); 'The Parliamentary History of the Irish Land Question' (1880); 'Fifty Years of Concessions to Ireland' (1880–5); 'Irish Wrongs and English Remedies' (1887); 'Life of Charles Stewart Parnell' (1898); 'Life of Lord Russell of Killowen' (1901); etc.

O'Brien, William, Irish journalist: b. 2 Oct. 1852. He was for several years a contributor to various journals, in 1880 founded 'United Ireland,' entered Parliament as a Nationalist in 1883, retired in 1895, and was re-elected in 1900. In 1898 he started a new agra-

rian movement, called the United Irish League, with the 'Irish People' as its organ. Among his works is 'Irish Ideas' (1894).

O'Brien, William Smith, Irish politician: b. Dromeland, County Clare, Ireland, 17 Oct. 1803; d. Bangor, North Wales, 17 June 1864. He was educated at Harrow and Cambridge, in 1826 entered the House of Commons as member for Ennis and in 1835 was returned for Limerick and retained his seat for 13 years. He was for some time an ardent supporter of O'Connell but on O'Brien becoming the head of the Young Ireland party the friendship was broken. He was active in the insurrection of 1848 and was arrested, tried for high treason, and sentenced to imprisonment for life at Tasmania. He was pardoned in 1856. He was the author of 'The Principles of Government' (1855). Consult: Sullivan, 'New Ireland' (1877); Duffy, 'Young Ireland' (2d ed. 1883).

Observantines. See FRANCISCANS.

Observatory, The United States Naval. See NAVAL OBSERVATORY, UNITED STATES.

Obsid'ian, a vitreous glass of volcanic origin, usually black, but sometimes brown, red, gray, or banded with combinations of these colors, varying from opaque to translucent. It is chemically a rather complex silicate, most commonly of aluminum. Next to its vitreous appearance the most striking physical characteristic is its conchoidal fracture, which was utilized by primitive races for the making of knives, and weapon-heads, notably by the Mexicans, who called the material *itztli* and quarried it in their mountains. The principal American variety is the chatoyante or cat's-eye, which contains a ruddy golden or silvery white gleam. The liparobsidians, or those resembling liparites, are best typified by the famous Obsidian Cliff in Yellowstone National Park; other acid obsidians are found in California, Mexico, Hungary, the Lipari Islands, and New Zealand. More basic sorts averaging 65 per cent of silica are found in Iceland, the Azores, and Milo. The vitreous type (with about 53 per cent of silica) occurs in volcanic districts, notably Kilauea and Réunion.

Obstet'rical Frog, or **Midwife Toad,** a small European frog (*Alytes obstetricans*) which which has the general appearance of a smooth toad. The upper parts bear many warts and are variegated in color, reddish spots becoming conspicuous in the males at the breeding season, and the under parts are dull white. It is found in Spain, Portugal, southern France and Switzerland, on high mountains as well as in the lowlands, and in town gardens and parks as well as in the remotest wilds, wherever a little water is available for a home. The species is thus very numerous, yet is rarely seen, for it is nocturnal, hiding quietly by day in some dark nook, or in a little hole dug in the ground by itself. At night, during all the warmer months, the males call to one another incessantly in a tinkling note which is not loud enough to be annoying. This frog gets its names from its peculiar manner of caring for its eggs. When the female feels the time approach for the discharge of her eggs, the male mounts upon her back and waits, assisting her efforts, for the extrusion of the ova, which at last happens suddenly. This takes place on land, not in the water. The eggs are comparatively large, and from 50 to 100 in number, connected by a gelatinous cord into two strings; and they are caught and retained, as in a dish, by the thighs of the female, which are extended straight behind her, close together. The male immediately fertilizes the eggs, and then proceeds to wind them about the upper part of his own legs, by thrusting his feet back and forth through the mass until they are fastened upon his thighs to his satisfaction. The female is then released, and the male carries his burden to his hole, where he remains, going abroad at night in search of food and to moisten the eggs in the dew, or occasionally in a puddle or pond. After about three weeks, the embryos are nearly mature, and the father takes them to the nearest water and remains within it until (soon) the tadpoles emerge. They are in a more advanced stage than in most frogs, but do not complete their metamorphosis until the following spring. Consult: Fischer-Swigart, 'Zoologischer Garten,' Berlin, 1885; Gadow, 'Amphibia and Reptiles' (1901).

Obstetrics, that department of medical practice which deals with the care and treatment of women during and after pregnancy and childbirth, and with the care of the child when born. It is one of the most important branches of medicine. The study of all of the parts of the female body concerned in the processes of procreation, the normal and abnormal functions during pregnancy and childbirth, beside the care of the mother and child during the early weeks following birth, all fall within its province. Although the function of child-bearing is strictly physiological, it is a process of great complexity and shows many abnormal features, so that in ancient as well as in modern times it has always caused an immense amount of sickness and suffering. Happily the art of obstetrics is being established on a rational and scientific basis, and the mortality, suffering, and after-invalidism due to child-bearing are being reduced to a minimum. As would be natural with such a universal fact as reproduction, many and curious myths and customs have had their day, to give way to equally fantastic ideas. Among ancient peoples obstetrics had its special workers, and among savages at the present time a crude obstetric art is practised. Among the Chinese in prehistoric times (3000 B.C.) midwives were the chief attendants on pregnant women. The length of pregnancy is given in the oldest existing works on medicine as 270 days. Women then were compelled to stay in bed at least three days and for 14 days were not allowed to see visitors. In ancient Assyria and Babylonia midwives were many, and to these women helpers was entrusted the care of the pregnant woman. This custom has continued to the present time, but with the gradual increase in education the better qualified physician is called upon with increasing benefit both to the mother and child. Physicians have also, however, been employed in this work since the earliest times. The modern era of obstetrics covers scarcely more than 30 years. The practical annihilation of puerperal sepsis by methods of cleanliness has revolutionized the whole subject of obstetrics, as the knowledge of bacterial infections has done with every branch of medi-

cine. As the fœtus is practically under the control of the obstetrician at the present time, and as the danger of blood-poisoning can be eliminated, obstetrics, in the hands of the properly qualified, has risen to the level of an exact science. Women still die of childbed fever, but lack of proper care is the cause. Cleanliness is salvation. Dirty hands or finger-nails on the part of the nurse, midwife, or doctor may be fatal, and every mother should know it. In different lands and in varying races the age of child-bearing varies from about 10 to 18. In European races the average is about 14 to 15. Women of warmer climates mature more rapidly than those of the temperate zones. The general period of cessation of child-bearing is about the 45th year. Eight years is about the earliest authentic recorded age of pregnancy, and women of 60 or 70 have been known to have children. One case of pregnancy, with birth of child, is said to have occurred in a woman of 103 years, but the authenticity of this is doubtful. Following impregnation, which occurs normally only as a result of coitus, the ovum, which in the great majority of cases has previously come from the ovary, descends the Fallopian tube and becomes fastened to the wall of the uterus. Here a rich supply of blood-vessels grows up and around it to nourish the developing fœtus. This set of blood-vessels subsequently becomes the placenta, or afterbirth, and constitutes the chief medium of blood-supply between mother and child. Following impregnation a characteristic series of symptoms occur in the pregnant woman. Menstruation ceases, as a rule, the breasts begin to give peculiar sensations, the woman urinates more freely, and her nipples have darker lines about them. These are the early signs. Later — from six weeks to a few months — she notes morning discomfort, with perhaps nausea and vomiting; constipation begins to annoy her; the abdomen begins to swell; the breasts become tender; and the bladder grows troublesome. Still later the nausea may disappear; the swelling uterus makes itself more and more prominent; the breasts become fuller, firmer, and have a waxy exudation. At the end of about nine months — 270 to 280 days — labor begins. This is usually preceded for about two weeks by a distinct drop of the child in the pelvis, whereby the waist-line sinks very perceptibly. Labor is ushered in by some premonitory cramp-like growls, with inability to hold the urine, and by the escape of a certain amount of fluid in which the child has floated for the final three or four months or more. Irregular pains, which slowly increase in severity, cramp-like in character and intermitting, continue for from 4 to 24 hours or more. These constitute the first stage of labor, and are premonitory and useful in dilating the opening of the uterus (q.v.), the cervix. The pains become more severe and frequent, and longer in duration, and the second stage of labor, during which the child is to be squeezed out of the uterus, begins. This is a very distressing time and, were it not for the intermissions in the pain, would be unendurable. The pains become faster and harder, the bag of water usually bursts, and with further cramps the child progresses, head-first, through the vagina into the world. Here meeting with a cold reception when compared to the warmth of the body from which he came, he reflexly cries out and, with cleansed mouth, takes his fill of air.

Following the birth of the child there is a quiescent period for a few moments to half an hour, then with further pain the uterus squeezes out the afterbirth, and the third stage of labor is completed. The cord connecting the child and the placenta is cut between two knots and the infant becomes an entity. The length of time of the second stage varies widely. In first children, and in older women, with the first baby particularly, it is apt to be longer. From two to six hours may be said to be the average. Following the birth, the mother should lie in bed, and the child be put to her breast at regular two-hour intervals. Although the milk will not come for a few days, the child begins a regular habit, and the breast receives its normal stimulus. It is wise for the young mother to remain in bed at least 10 days, as this favors the return of the uterus to its normal size and place. Many deviations from this normal course may take place.

Ocala, ō-kā'la, Fla., city, county-seat of Marion County; on the Florida Central & P. and the Plant System R.R.'s; about 160 miles in direct line southeast of Tallahassee and 70 miles southwest of Saint Augustine. The noted Silver Spring is about five miles east of Ocala. It is in a region in which are raised large quantities of cotton, oranges, and vegetables. Other products which are sent to northern markets are lemons and sweet-potatoes. It has considerable trade in phosphate found in the vicinity. The sewerage system is most unique, it being formed by a subterranean river, which was accidentally discovered while drilling for a well. Neither the source nor the mouth of the river have been discovered. The city owns and operates the electric-light plant. Pop. (1890) 2,904; (1900) 3,380.

Ocala Platform, in American politics, a series of resolutions passed at the national congress of the Farmers' Alliance, held at Ocala, Fla., 8 Dec. 1890. It demanded the abolition of national banks; the establishment of subtreasuries which should lend money directly to the people at low rates of interest, free coinage of silver, low tariff, the prohibition of alien ownership of land, and a graduated income tax.

O'Callaghan, ō-kăl'a-hăn, **Edmund Bailey,** American historian: b. Mallow, County Cork, Ireland, 27 May 1797; d. New York 27 May 1880. He was educated in Ireland and in France, removed to Canada in 1823, where in 1827 he became a medical practitioner, and was editor of the 'Vindicator' in 1834. He was elected to the assembly of Quebec in 1836, but after the insurrection (1837) he removed to the United States, where he spent many years in the office of the secretary of state at Albany employed in editing the records of the State. He wrote: 'History of the New Netherlands' (1846); 'A Calendar of the Land Papers' (1864); 'Voyages of the Slavers St. John and Arms' (1867); etc.

Ocaña, ō-kā'ña, Colombia, a town in the department of Santander, on the Taira River, 230 miles north of Bogota. It was founded in 1572, and is the commercial centre for the coal,

lead, coffee, and other products of the district. Pop. 6,000.

Ocarina, ŏk-ą-rē'na, a musical instrument originally used in Calabria by the peasants. It consists of a gourd-shaped clay bulb, pierced with a number of small holes and a mouthpiece. Its tone was sweet, but the range was exceedingly limited — less than an octave — but in the course of subsequent development its compass and power were greatly augmented.

Occam, ŏk'ąm, or **Ockham, William of,** mediæval controversialist, of the Franciscan order, known as "VENERABILIS INCEPTOR" and "DOCTOR INVINCIBILIS": b. Ockham, Surrey, 1270; d. Munich 7 April 1349. He was educated at Oxford, where he studied under Duns Scotus, and subsequently proceeded to the University of Paris. He took part (1321) in the controversy on the subject of "evangelical poverty," and was present at the general chapter of Perugia, which decided it in the following year. Pope John XXII. condemned the decision of the chapter, and Occam defended it against him, for which he was by order of the Pope imprisoned at Avignon. He escaped, however 1328, and a vessel sent by Louis the Bavarian conveyed him to Italy. The Pope excommunicated the fugitive, and vainly tried to get him sent back to Avignon, but Occam from that time resided at the court of Louis and engaged in polemical warfare with papal authority. He charged John XXII. with teaching heresies, and when Louis in 1348 declared the imperial accession independent of papal confirmation Occam supported him. On the death of Michael da Cesena in 1342 he became general of his order, though not recognized by the Pope. In logic and philosophy Occam occupies a distinguished place. His principal work is 'Summa Totius Logices.' Consult: Riezler, 'Die literarischen Widersacher der Päpste zur Zeit Ludwig des Baierns' (1874); and Poole's article in the 'Dictionary of National Biography,' Vol. XLI.

Oc"canee'chi Indians, an American tribe of the Siouan family residing in southern Virginia in the 17th century. They aided the white settlers against the invasion of northern Indians in 1676. In 1701 they removed to North Carolina, near the present town of Hillsboro, and disappeared by uniting with other tribes.

Occasional Causes. See DESCARTES, RENÉ; METAPHYSICS.

Occleve, ŏk'klēv, or **Hoccleve, Thomas,** English poet of the 15th century: b. about 1370; d. about 1450, both dates being based merely on the internal evidence of his poems. He evidently knew Chaucer, and the famous portrait of Chaucer on the margin of the Harleian MS. of the 'De Regimine Principum' may have been drawn by Occleve himself. Besides this poem, which was edited by Wright in 1860, Occleve wrote the autobiographic sketch 'La Male Regle de T. Occleve,' and various shorter poems, the most notable being the 'Mother of God,' an orison to the Virgin, long attributed to Chaucer. Occleve's poems are edited by Furnivall (1892–7).

Occlu'sion, in chemistry, a name given by Graham to the property of metals to absorb, or hold in solution, gases. This property is most remarkably displayed by platinum and palladium in their affinity for hydrogen, of which platinum will absorb 114 times its own volume and palladium between 700 and 800 times its own volume. The entire class of oxides illustrates again this special kind of absorption. The term is also used of mere surface condensation, as of ammonia or oxygen in charcoal.

Occom, ŏk'ŏm, **Samson,** Indian preacher: b. Mohegan, New London County, Conn., about 1723; d. New Stockbridge, N. Y., 14 July 1792. He entered the Indian school of Mr. Wheelock at Lebanon, remained there four years; in 1748 kept a school in New London, but shortly after removed to Montauk, Long Island, where he taught and as a licensed Congregational minister preached to the Indians. In 1759 he was ordained to the Presbyterian ministry, with which he remained connected. In 1766 Mr. Wheelock sent him to England as an agent for an Indian charity school. Being the first Indian preacher who had visited that country, he was successful in attracting large audiences and obtaining donations exceeding £10,000. After his return to America. Occom preached at various places, passing his latter years within the bounds of the Albany presbytery. He wrote an account of the Montauk Indians, printed in the (Mass.) Historical Society collections (1st series, vol. x.), and published a sermon on the execution of an Indian at New Haven in 1772.

Occultation. The occultations of stars and planets by the moon, as in its eastward motion during the month it passes in front of star or planet and blots them for a while from view, have, in a measure, their counterpart in occultations of stars by planets, or by comets, and also in the occultations of satellites by their primaries.

Occultations of the Moon.—The general theory of occultations is analogous to that of solar eclipses. (See ECLIPSE, *Bibliography.*) For stellar occultations, however, considerable simplification occurs because the apparent radius of the occulted body is indefinitely small and there are but two instants to be computed, namely, the immersion or disappearance of the star, and its emersion or reappearance from behind the moon's disk. The elements for the prediction of the occultations of stars are given in all the national ephemerides, chiefly according to Bessel's method. In the 'American Ephemeris' these elements are given for stars down to 7.5 magnitude. Observations of the occultations of stars are chiefly valuable as furnishing indispensable data for determining the distance, size, and motions of the moon. (See MOON.) The accuracy of a lunar position thus determined is many times that of the ordinary meridian observations of the moon's limb. The occasion of a total lunar eclipse offers special facilities for determining with great accuracy the occultations of a number of small stars. The best lunar method of determining the longitude of a place is that of observing the occultations of stars, and it has only been superseded by the telegraphic method of the comparison of signals.

The immersion and emersion of stars in occultations by the moon are accompanied by phenomena of a varied character, which have been the subject of much discussion. Some astronomers have been willing to dispose of all these phenomena by vaguely describing them as due to physiological causes, without attempting any scientific explanation, and without

satisfying the experience of the more acute and sensitive observers. The various phenomena noted may be scheduled as follows: (1) Instantaneous disappearance or reappearance of the star. (2) Apparent projection of the star upon the moon's limb. (3) Sudden change of magnitude. (4) A slow disappearance or reappearance, sometimes described as "gliding." The instantaneous immersion or emersion of the dark limb is naturally to be expected, and is readily accounted for by the assumption that the moon has no appreciable atmosphere, and that the apparent angular diameter of the stars is insensibly small. This instantaneous disappearance is very usual under conditions of good seeing, although under such conditions also, when the star apparently approaches closely to the moon's serrations along the dark north or south limb, it has been seen to disappear behind a mountain and reappear in the next valley, and so on. Such instances have been particularly noted by the elder Bond and by Davidson. These disappearances and reappearances are to be distinguished sharply from those not associated with the finest definition. Sensible displacement of stars with respect to the moon at occultation, or a "clinging" upon the lunar limb, has frequently been observed, and although attributed by Innes to improper focusing, or focusing on the red star so as to throw the moon's image out with respect to it, it is probably, as Davidson suggests, due to the formation of a "factitious or spurious limb" of the moon by irregular refraction, upon which the star is projected through the unconsciously selective action of the eye on the star image. It is chiefly large, bright, and mostly red stars, like Aldebaran and Antares, that have been projected upon the whitish, spurious border of the moon. "With a large, colored star," says Davidson, "all the phases of this phenomenon are unmistakable; with a large white star, they may be somewhat in doubt; with a small white star, they will probably not be noted, especially in small telescopes with low power." With this phenomenon the true immersion is still instantaneous. Sudden decrease in the magnitude of the disappearing star, as if in two distinct stages, has again and again been noted by expert observers. In certain instances this distinct phenomenon has been proved to be due, and in all cases is probably due, to the occultation of a double star. It seems likely that a very close observation of these light changes at occultation will more and more be deemed a valuable means of detecting very close double stars lying in the moon's path. The "gliding" or gradual occultation of stars is, with some show of probability, attributed by Innes to occultation of double stars too close to make a separate physiological impress. He thinks that close doubles of a period too long for spectroscopic discovery and yet too close for visual detection, may thus reveal themselves by the magnification due to the appreciable interval taken by the moon in traversing an arc too small for direct measurement. In both of the cases of "disappearance in two distinct stages" and of "gliding" the position angle of the double star with respect to the moon's path, as well as the angular separation of the components, enters as a factor of the delicate phenomenon.

Occultations of Planets.— The phenomena attendant upon occultations of planets by the moon differ somewhat from those of stars. The beautiful and startling appearance which Venus and the new moon present to the unaided eye at the time of this planet's occultation, and the early association of the new moon with religious festivals, has led to the crystallization of this phenomenon as a symbol on the Turkish flag and is also thrice emblazoned on the Egyptian. The phenomenon of an occultation of Jupiter, photographed and visually observed at Arequipa in 1892, led W. H. Pickering to an interesting discussion of the apparent effect of a slight lunar atmosphere. Of an occultation of Saturn 3 Sept. 1900, G. G. Tupman says that it "disappeared at dark limb, which was not visible except on the planet and ring. The last little patch of light, longer than broad, parallel to the moon's limb, seemed to linger strangely. The distance of centres was diminishing 0.28″ per second, and the moon seemed to travel very rapidly across the planet and ring." It seems undesirable to speculate on this phenomenon further than to class it with similar phenomena of displacement of stars at the occulting limb of the moon.

Occultations by Planets.— The observation of the occultations of stars by planets may be utilized in determining the position and diameter of the planets. and in securing some knowledge of the effect of their atmospheres on the phenomena. The prediction of these occultations by planets was for some time annually made by Berberich of the 'Astronomisches Jahrbuch.' The phenomena of immersion and emersion have, in the cases of Mars as observed by South, and of Venus by Cerruli, been practically instantaneous. Only a slight hesitancy in reappearance was noted in the latter case. An occultation of a 6.5 magnitude star by Jupiter, as recently observed by H. Struve, gave the times of the immersion and the emersion uncertain from 7 to 10 seconds and showed these times to be phenomena of a gradual character.

Occultations of Satellites.—The occultations of Jupiter's satellites by the planet are a part of the general theory of the configuration of the Jovian System as seen from the earth, and are regularly predicted in the 'American Ephemeris' and 'Nautical Almanac,' and other Ephemerides. The projection of the satellites within the apparent limb of Jupiter at occultation, has been seen by many observers and is satisfactorily explained by the effects of atmospheric disturbances on the planetary edge just as in the case of the star's projection on the disturbed and spurious limb of the moon.

Occultations by Comets.— The passage of comets over stars, as visually and photographically observed, has disclosed some facts of interest in this class of occultations. Until quite recently, all observers agreed that the nebulous envelopes of comets do not absorb the light of stars, and long ago Olbers had shown that there was no evidence of refraction by comets. One eminent observer after another has recorded the occultation of a star or cluster of stars by a comet without sensible diminution of the light of the stars, and this phenomenon has also been markedly attested by the photography of comets. A few observers have noted the diminution or even the complete extinction of stellar light in their occultations by comets. Max Wolf has, moreover, recently demonstrated by photography that the envelope of Comet 1903*c* exercised a selective absorption on a 6.5 magnitude star and that the same comet failed to absorb the light

of a less brilliant star of a different type. The projection of the stars upon the envelopes and tails of comets thus not only affords means for accurate measurement of the position and form of these objects, but promises to supply occasional hints of the cometary absorption of stellar light.

Bibliography.— Bessel's method of treating predictions of occultations is given in 'Astronomische Nachrichten' (No. 145). A number of graphical, or partly graphical, methods, useful to observers in predicting occultations, have been published in recent years. Among these may be mentioned the suggestions of G. W. Hough in 'Popular Astronomy' for 1897; Major Grant's diagram given in 'Hints to Travellers'; M. G. Bijourdan, 'Occulations' in the 'Annales de l'Observatoire de Paris' (Vol. XXIII.), and the graphical method of Rigge, No. 3786, 'Astronomische Nachrichten.' In the same journal, (No. 2388), Seeliger has discussed the conditions of frequency of occultation of stars by planets.

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Oc'cupancy. See POSSESSION, LAW OF.

Occupation, Hygiene of. This subject covers a consideration of the health of those who labor as affected by the varieties and conditions of their work, as well as a consideration of disease or deterioration arising from trades and pursuits. Its consideration, therefore, includes much that has been discussed under hygiene and sanitation (qq.v.), such as a proper amount of sunlight, adequate air-space in proportion to the number of people in a room, frequent or constant ventilation, the removal of waste products, the condition of the soil under dwelling or factory, the regulation of temperature, water-supply and drainage, etc.

In the special field of hygiene of occupation are included maladies resulting from harmful influences in certain occupations, whether due to poisons, infections, or irritants. Legislation has, in many countries, been directed toward the improvement of all the conditions of labor, and has resulted in shortening hours, prohibiting the young or immature from certain work, and neutralizing poisons; and the tendency of paternal law is to place industrial diseases on the same footing as accidents occurring at work. Ordinances generally fail of being effective in the cases of those who work at home, and this part of the problem is very serious. Scientific experiments are establishing the laws of muscular activity, and in the near future the pathology of fatigue will become so exact a branch of physiology that the workingman will be protected against the condition of being overtired, physically or intellectually, a condition during which resistive power is lessened and disease is invited. Outdoor occupations entail less disease and result in a much lower mortality than indoor pursuits. In fact, among gardeners and nurserymen deaths are but 55 per cent as frequent as among a general male population. The mortality of farmers varies from 31 per cent in youth to 88 per cent in old age of the mortality of a general male population. Reasoning from mortality statistics as to the amount of damage to health resulting from occupation is always open to objection, because of the admitted facts that alcoholism and phthisis cause a large number of deaths among occupied males.

A fair conspectus of the subject will result from considering the trade diseases under the heads which follow:

Dust-Producing Occupations.—Among the trades in which dust is a deleterious agency are those of the baker, blacksmith, brass-worker, bricklayer, carpet manufacturer, cooper, coppersmith, cotton manufacturer, cutler, filemaker, gunsmith, iron and steel worker, lead-worker, locksmith, ropemaker, stonecutter, tin-worker, wool manufacturer and zinc-worker. In these industries the mortality from diseases of the respiratory organs is twice that of agriculturists. A fibrosis of the lung, in many cases, and in others pulmonary tuberculosis results from the bombardment of the lung tissue with fine particles inhaled. Many eye affections also result from dust.

Workers in Poisons.—Those who work in poisons show a large mortality. The members of this class are those working with lead, arsenic, phosphorus, mercury, the bichromates, copper, brass, india rubber, tobacco, chemicals, and drugs. Lead-miners, lead-smelters, makers of litharge, white-lead workers, calico-printers, ironware enamelers, type-founders, compositors, painters, plumbers, glass-polishers, file-cutters, potters, and chromo-lithographers suffer from lead-poisoning (see LEAD). Workers in colored papers, wallpapers, toys, japanned goods, imitation leather, for which arsenical pigments are used, as well as taxidermists, suffer from arsenic poisoning. Among the symptoms are conjunctivitis, nasal catarrh, headache, colic, diarrhœa, bronchial catarrh, dyspepsia, boils, insomnia, depression, and (rarely) paralysis. Makers of matches suffer from inflamed and painful gums, decaying teeth, and death of the jawbone, as a result of phosphorus-poisoning; they become pale, ill-nourished and tuberculous. Mercury-poisoning is the penalty of smelting cinnabar, making thermometers and barometers, making incandescent electric lamps (with a mercury vacuum), gilding, making vermilion, and treating furs. The symptoms are salivation, sore mouth, loss of teeth, headache, dizziness, pains in limbs, twitching of muscles of face, marked and disabling tremor, and general nervousness. The bichromates of potassium and sodium are used in making colors, calico-printing and photography, as they are excellent mordaunts for wool. They cause bronchitis, asthma, and ulcers, especially ulcers of the nasal cartilages. Copper and brass workers suffer from languor, depression, cold perspiration, nausea, muscular pains, headache, fever, and great debility. India-rubber workers are poisoned by the bisulphide of carbon used. Tobacco and cigar-makers, especially when tyros, suffer from headache, nausea, dizziness, faintness, transient loss of sight, and catarrh, and patches of induration appear in their lungs. The makers of drugs and chemicals suffer from the fumes of acids and irritating gases, from high temperatures, and from alkali dust.

Mining and Quarrying.—These occupations involve danger to life and health from accidents, such as being crushed by rock or coal, or injured by machinery, explosions, falling from ladders, etc.; and from gases and foul drinking-water.

Workers in Compressed Air.—These suffer from caisson disease (q.v.).

Trades Risking Infection.— Such trades are the working in hides or horsehair, wool-sorting, whereby anthrax (q.v.) is contracted; also rag-sorting and grinding, those who work at which being liable to any disease prevalent in the country from which the rags come.

Occupation Neuroses.— Disorders so classed are nerve affections whereby the worker is incapacitated as a result of muscle-tire. Overuse causes a constant fatigue in certain groups of muscles. The most prevalent examples of this class is writers' cramp, which dates from 1820, when steel pens displaced quills. It is oftener found in men than in women, and occurs mainly between the ages of 25 and 40. Continuous writing, especially under mental pressure, operates as the exciting cause; but like all occupation neuroses, it is grafted on an underlying neurasthenia, runs a chronic course, and is difficult to relieve. During the use of the pen, the hand clenches involuntarily, and the pen is driven into the paper and downward toward the wrist. The use of the typewriter is the only refuge, though many forms of apparatus have been devised to obviate the trouble. In some cases neuritis follows. Other forms of these neuroses are telegraphers' cramp, affecting one in 200 operators; musicians' cramp; milkers' spasm, a rare affection; sewing spasm; etc. In these cases the underlying neurasthenia must be treated. Rest, massage, electricity, and hydrotherapy are useful.

In the treatment of all trade diseases removal of the cause is imperative. In nearly all of them ventilation and sanitary precautions are essential. Organic conditions must be treated separately, according to their nature. Consult Arlidge, 'Hygiene and Diseases of Occupations' (1872); Oliver, 'Trade Diseases' (1903).

Ocean, The, or **Sea,** comprises the continuous body of water which covers the greater part of the earth's surface, the area being 2½ times that of the dry land. The latter is for its greater part aggregated on the Northern hemisphere, the Southern is preeminently oceanic. The Ocean is divided into five great divisions which have partly natural, partly imaginary boundaries.

The Pacific, the largest one, is bounded on the east by America and the meridian of Cape Horn, on the west by Asia, the Great Sunda Islands, Australia and the meridian of Tasmania, on the north it terminates in Bering Strait and on the south at the Antarctic circle.

The Atlantic Ocean, the next in size, is bounded on the east by the coasts of Europe, Africa and the meridian of Cape Agulhas, on the west by America and the meridian of Cape Horn, and on the north and south by the Arctic and Antarctic circles respectively.

The Indian Ocean is bounded on the east by the Great Sunda Islands, the west and south coast of Australia and the meridian of Tasmania, on the west by the coast of Africa and the meridian of Cape Agulhas, on the north by the coast of Asia and on the south by the Antarctic circle.

The Arctic and Antarctic Oceans comprise the waters between the Arctic circle and the North Pole, the Antarctic circle and the South Pole respectively. The actual boundaries of the oceans do not always agree with these theoretical ones; thus the northern coasts of America, Europe and Asia are the actual boundaries of the Arctic Ocean; Hudson Bay and the White Sea are included, although they reach far into the Temperate zone. Furthermore, the Arctic circle is not the actual boundary between the Arctic Ocean and the Atlantic, but a line drawn from Greenland to Norway by way of Iceland, the Faröe and Shetland Islands. From a morphological point of view there is no such thing as an Antarctic Ocean; there are no land surfaces or submerged ridges that separate it from the adjoining oceans. The area should properly be divided among the adjoining great oceans — the Atlantic, Pacific and Indian; when we speak popularly of Antarctic Sea and Antarctic expeditions we refer to the entire region that lies south of the extreme southern points of the land masses, Cape Horn, Cape Agulhas and Tasmania, in latitudes 56° S., 34° 51′ S., and 43° 40′ S., respectively.

Areas.— The areas of the three great oceans are given at 67.7 million square miles for the Pacific, 34.7 for the Atlantic, and 18.6 for the Indian. The two Polar Seas are much smaller, but no exact figures can be given for the reason that there are about 3.1 million square miles in the North Polar regions and 8.3 in the South Polar regions wholly unexplored. The highest latitudes reached in the eastern Arctic Ocean are 86° 13′ in lon. 96½° E. (by Nansen, 1900), 86° 34′ in lon. 64½° E. (by Cagni), in the western Arctic Ocean 84° 17′ to the northward of Greenland (by Peary, 1902). In the Antarctic Ocean the highest latitudes are 74° 15′ in lon. 34° W. (Weddell, 1823), 71° 36′ in lon. 88° W. (the Belgian Expedition, 1898), and 78° 50′ in lon. 167° W. As to dimensions, the Pacific is the widest, with 9,400 nautical miles between Panama and the Philippines; the Atlantic is much narrower, about 3,700 nautical miles between Cape Agulhas and the La Plata, or 4,500 miles between Cape Bojador on the African Coast and the Rio Grande, if we include the Gulf of Mexico. The Indian Ocean has its greatest width between the southern capes of Africa and Australia, over 6,000 nautical miles. The distribution of islands plays a prominent part in the physiognomy of the oceans. We have to distinguish between oceanic and continental islands. The open Atlantic is rather poor in oceanic islands, more so is the eastern part of the Pacific, and especially poor is the northern part of the latter ocean and the eastern part of the Indian Ocean. The South Pacific is unsurpassed for its wealth of oceanic islands; "small size" is a characteristic feature of these islands, in fact the hundreds and thousands of Polynesian Islands have a total area less than that of Celebes. Each ocean has its share of continental islands, which includes not only those near continents, but also such as have a continental structure, of which New Zealand is a type. The Pacific has its East Indian Archipelago, New Guinea, etc.; the Atlantic, the British Islands, the Antilles; the Indian Ocean, Madagascar and Ceylon; the Arctic, Greenland, Nova Zembla, etc. According to size Greenland with 0.81 million square miles heads the list of large continental islands, with New Guinea, Borneo, Madagascar, Sumatra, Nipon, Celebes, Java and Cuba following in the order of size. There is yet another element which imparts diversity of character, not only to different oceans, but to

different parts of the same ocean — the development of the coast line. An ample development, the presence of deep incisions, is considered a great factor in the promotion of culture. Europe with the Mediterranean, Baltic, North Sea and English Channel; the eastern coast of North America with the Gulf of Saint Lawrence, the Gulf of Mexico and Caribbean Sea, are especially favored in this respect, while the absence of deep incisions is noticeable in the contour lines of the southern continents, notably Africa and South America. A very peculiar feature in this respect is the border seas which line the eastern coast of Asia, these are in succession, commencing at Bering Strait, the Bering Sea, Okhotsk Sea, Japan Sea, East Sea, and South China Sea. A very rich development, though on a smaller scale, is imparted by glacial action to coast lines in northern regions; we notice this especially on the coasts of Norway, Iceland, Greenland, and the northeast and northwest coasts of America.

Depth.—The mean elevation of the land surface is estimated at about 383 fathoms, and the mean depth of the sea at between 1,900 and 2,000 fathoms, hence the latter is about five times as great as the former; but, in spite of this disparity, the culminating heights of the land (the Gaurisankar with 29,000 feet) approach very nearly the greatest depths of the sea (the Guam trench with 5,269 fathoms or 31,614 feet). The mean depth of the three great oceans is about the same, the Pacific is slightly deeper and the Indian rather shoaler than the Atlantic Ocean.

The bed of the Atlantic has a peculiar form; instead of one deep basin separating the Old and New Worlds, as it was thought to be fifty years ago, there are two separate troughs, one on the American and the other on the European side, separated by a rise which commences at Iceland and passes through the middle of the ocean, taking in on its course the Azores, Saint Paul and Ascension Islands, and has been traced as far south as lat. 40° S. This rise was formerly designated the Dolphin Rise, but in modern nomenclature it is Atlantic Rise. The troughs, which are divided by gentle swells into several basins, terminate on the south in two cross ridges, the Rio Grande and Whale Ridges, and on the north in a ridge stretching from Greenland to Iceland and thence to the Shetland Islands. It is called the Icelandic Ridge and has a depth of less than 328 fathoms. The depth of the basins exceeds 3,000 fathoms (3,825 southeast of the Bermudas). The greatest depth, however, 4,662 fathoms, is not found in these basins, but in a trench off Porto Rico which terminates in the Old Bahama Channel. It has been noticed that the arms of the North Atlantic in the higher latitudes, like the Baltic, North Sea and English Channel on the European side, and Hudson Bay and the Gulf of Saint Lawrence on the American side, are shallow, while those in lower latitudes have comparatively great depths, the Mediterranean 2,406 fathoms, the Bay of Biscay 2,625 fathoms, the Gulf of Mexico 2,119 fathoms, and the Caribbean Sea 3,428 fathoms.

In the Pacific we find the northern part decidedly deeper than the southern. In about lat. 20° N. are the Hawaiian Islands rising from a plateau of over 1,000 fathoms depth and to the northward and southward of it are basins with over 3,000 fathoms depth which extend in an east and west direction over the greater part of the width of the ocean. The southeastern Pacific or, more definitely speaking, that part to the eastward of the Marquesas and other coral islands, appears to have been more charily located by the explorers and surveyors than any other part of the great oceans. We have no exact knowledge of the disposition of its basins and ridges, but may form some conception of the depths from the observation that, barring the immediate vicinity of the coast, there are no soundings recorded of less depth than 1,450 fathoms, or more than 2,711 fathoms. Farther west we notice the groups of innumerable coral islands which have become historic from the investigations of Forster, Darwin, Dana and A. Agassiz. They rise rather precipitously from depths of between 1,000 and 3,000 fathoms. Only passages of very moderate depth lead from the deep parts of the western Pacific into the Indian Ocean through the archipelago of islands which separates Asia from Australia, but within this archipelago there are several basins which show rather remarkable depths — the China Sea with 2715 fathoms, the Sulu Sea with 2,550 fathoms, the Celebes Sea with 2,795 fathoms, the Banda Sea with 4,000 fathoms, and the Coral Sea with 2,518 fathoms. The uniformity of these depths appears to indicate that these successive basins were at some remote period parts of a continuous sea and that their separation is due to volcanic eruptions. The discovery within the last thirty years of several areas of local depression in different parts of the Pacific whose depth is far in excess of those of the large basins, also leads to the supposition that they are the result of violent volcanic action. They are found in close proximity to the coast of the mainland or close to chains of islands in the shape of longitudinal depressions, designated as trenches. The deepest one of these trenches is the Guam with 5,269 fathoms (the deepest sounding ever recorded), the Kermadec-Tonga with 5,155 fathoms, the Japan with 4,656 fathoms, the Aleutian with 4,037, and the Atacama, off the coast of Peru and Chile, with 4,175 fathoms depth.

Of the three great oceans the Indian appears to be the least complicated in form, having only one great basin of 3,532 fathoms depth; this is found in its eastern part, in the bight formed by the west coast of Australia and the Great Sunda Islands.

The Arctic Ocean may properly be divided into two parts, separated by Greenland, which descends into the temperate zone to latitude 60°. The eastern part lies north of Europe and Asia and the western part north of America. This ocean was formerly credited with very moderate depths, less than 700 fathoms, this mainly for the reason that the regions earliest known, those just north of the continents, were very shoal, but late Arctic expeditions have shown the existence of a deep trough, 2,650 fathoms between Greenland and Spitzbergen, which is taken as a continuation of that of the Atlantic beyond the Icelandic ridge, and also depths of over 2,000 fathoms far to the eastward and northward of Spitzbergen, indicating the existence of another large basin. In the western part we find at Davis Strait, in about the latitude of the Arctic circle, a barrier of 360 fathoms depth which separates the trough of the western Atlantic

from Baffin Bay. Except Baffin Bay, which has depths of over 1,000 fathoms, the entire region to the westward as far as Bering Strait seems to be shallow; in Bering Strait the greatest depth is only 28 fathoms.

Since the time of the Antarctic expedition of Wilkes and James Ross (1839–43) the opinion has prevailed that the Antarctic Ocean was one of inferior depth and that a gradual shoaling would have to be expected from the southern parts of the great oceans toward the Antarctic continent. This opinion was based upon the nature of the soundings which Ross took near the newly discovered land and which indicated a rapid shoaling, but has been dispelled by the results of the recent Antarctic expeditions which show depths of over 3,000 fathoms to the southward of Africa in about lat. 60° S., 2,975 fathoms between Madagascar and Kerguelen Island, and between the latter and the Antarctic Continent 2,540 fathoms. We are rather interested in the depths existing between the southern capes of the continents and the nearest land to the southward in order to ascertain if any submarine connections exist, such as we have traced between North America and Asia on one side and Europe on the other. Between the Cape of Good Hope and Bouvet Island 2,962 fathoms have been found, between Cape Horn and the New Shetland Islands 2,106 fathoms; there are no soundings between Australia and the Antarctic continent, but rather less than 2,000 fathoms are expected.

Composition and Density of Sea Water.—The briny taste and higher specific gravity of sea water than fresh water is due to the presence of salts, held in solution, and although the absolute quantities of these salts are very variable, the relative proportions are always very nearly the same. In 1,000 parts of sea water are found on an average 26.9 parts of chloride of sodium (common salt), 3.2 parts of chloride of magnesium, 2.2 parts of sulphate of magnesium, 1.3 parts of sulphate of lime and 0.7 residue.

The salinity is increased by evaporation on the surface, and although this is supposed to be always active, it is greatly promoted by high temperature and strong dry winds. The salinity is diminished by the addition of fresh water either from rivers, rain or melting ice. The highest salinity is found in the regions of the trade winds with the following results: 37.9 in the North Atlantic, 37.6 in the South Atlantic, 36.4 in the Indian Ocean, 35.9 in the North and 36.9 in the South Pacific, each in 1,000 parts of water. Between these regions of high salinity in approximately latitudes 20° to 30° both north and south, there is found in the neighborhood of the equator a zone of low salinity, 35.5 to 35.0 in the Atlantic and 34.5 to 34.0 in the Pacific, and this is attributed to heavy rains and weak, humid winds. In the higher latitudes a rapid decrease of salinity is noticed with increase of latitude, except in regions that are reached by the Gulf Stream drift; thus a density of 35 is found beyond lat. 76° N. between Spitzbergen and Norway, while in the southern oceans this density is not met with far beyond lat. 40° S., and not so far in the North Pacific. The Gulf Stream, which is fed by the highly saline waters which both the north and south trade winds convey to the eastern shores of North America, has a density at least as high as the North Atlantic in the trade-wind region, while several arms of the sea in the Bahamas have a density greater still.

The greatest densities, exceeding those of the open ocean, are found in land-locked basins in warm and dry climates; thus we find 41 in the Red Sea, 38 in the Persian Gulf, 37 in the Mediterranean. Copious additions of river water reduce the salinity, and for this reason we find low densities along the eastern and Gulf coasts of the United States, and when such waters empty into basins with narrow entrances we observe even lower degrees of salinity, thus 15 to 18 in the Black Sea and from 5 to 8 in the Baltic. Salinity is also reduced by melting ice, as we notice especially in the North Atlantic, where two mighty currents, the East Greenland and the Labrador, carry vast quantities of ice in the shape of bergs and floes from the Arctic regions toward the south. Concerning the vertical distribution of salinity, it has been noticed that it decreases to the depth of 200 to 300 fathoms in those regions where a decided evaporation takes place, like the trade-wind regions, and increases to the same depths where a dilution occurs; that beyond these depths it decreases slowly to the depth of 1,400 to 1,830 fathoms, thence increases again until bottom is reached. In the inland seas, however, the density generally increases as the depth to the bottom.

Temperatures.—The rule holds good generally that the mean annual temperature of the surface waters is somewhat higher than that of the air, and that it fluctuates much less. The warmest water is found at the equator, and here the Indian Ocean and the western Pacific exceed in heat the Atlantic and eastern Pacific. From these equatorial regions there is a gradual decrease in temperatures north and south, but the temperatures of northern regions are generally higher than those of the southern in corresponding latitudes for the reason that the warm water which is carried by the southern trades across the equator is replaced by cold water from the Antarctic regions, which is assumed to be the coldest on earth. Furthermore, in the higher northern latitudes the eastern parts of the oceans are warmer than the western, the drift being northeast, and again, the northeast Atlantic is much warmer than the northeast Pacific for the reason that the Gulf Stream is a much more powerful stream than the Kuroshiwo. The warm waters which we meet at the equator reach to the depth of only about 50 fathoms, the cold waters which we meet beyond that depth are assumed to come from the Antarctic regions. In the regions of the trade winds the surface water, made heavy by evaporation, descends, and hence we find here in depths of from 50 to 250 fathoms the water from 4° to 6° warmer than in the equatorial regions. But this water moves not only downward, but drifts to greater distances from the equator. The last traces of these tropical waters we find in the bottom layers of the Arctic and Antarctic Oceans; this water has parted with nearly all the heat with which it started on its journey, by supplying cold currents and by melting ice, but still retains enough salt to betray its origin.

From the bottom regions of the Arctic Oceans there is a slow movement of the water toward the equator, and although that from the north

polar regions starts with much lower temperatures, between —2° to —3° C., it rapidly gains heat and shows temperatures of from +1° to +2° C. in middle northern latitudes, while under the equator and in southern latitudes the bottom temperatures do not vary greatly from 0° C. This distribution leads to the assumption that the cold waters which in the equatorial regions rise toward the surface, are of Antarctic origin. Theoretically no ice should be formed on the surface of sea water until the whole body of water has been reduced to less than —2½° C., but in the Arctic regions freezing generally takes place before this temperature is reached, on account of the slowness of vertical circulation, and warm layers are often found under the surface ice. For seven or eight months of the year the entire Arctic Ocean, with the exception of the southern parts of the Greenland Sea and Baffin Bay, is covered with ice. In the Atlantic, Iceland, the British Islands and the coast of Norway; in the Pacific the Pribilof Islands and Aleutian Islands are free of ice all the year round. Thawing in the Arctic regions commences about the end of May. The arctic summer is rather short, new ice begins to form in September. The discovery of a "northwest passage" from the Atlantic to the Pacific furnished the motive for the greater number of expeditions commencing with those of Cook (1778) and Vancouver (1792–4) on the Pacific side of America, and those of Parry (1819–24) and Ross (1831–3) on the Atlantic side; these undertakings were finally abandoned only after human endurance had been put to its severest tests and many lives sacrificed in the vain endeavor. Nordenskjöld in 1878–9 successfully accomplished the northeast passage by way of the Siberian coast; but the experience of subsequent expeditions teaches that the chances for finding an open passage all the way through are rather uncertain. In the Atlantic two great currents convey the melted ice with its freight of bergs and floes from the Arctic regions, the East Greenland and Labrador currents. The first one, after following the east coast of Greenland to Cape Farewell, turns north along the eastern side of Davis Strait, crosses over to the western side before reaching Baffin Bay and joins the Labrador current. The latter flows along the Labrador coast, sends a branch through the Strait of Belle Isle; but the principal part passes along the Newfoundland coast and banks, and if not dissipated by the warm waters of the Gulf Stream, dips under it. Here on the southern edge of the Banks of Newfoundland we witness the most rapid change of temperature found in any part of the ocean, in May 10°, from 5° to 15°, within two degrees of latitude, or from the temperature off the coast of Iceland to that off the coast of Spain. There are no arctic currents on this grand scale in the Pacific, the ice generally disappears a short distance south of the Pribilof Islands. In the Southern hemisphere we have a vast region of floe ice the limit of which is lat. 57° S. off Cape Horn and 38° S. off Cape of Good Hope. The vertical distribution of temperature in enclosed basins is essentially different from that in the open ocean by decreasing from the surface downward to the depth of the channel which opens into the ocean and remaining constant thence to the bottom. Thus in the Celebes Sea a uniform temperature of 3.8° is found between 860 fathoms and the bottom (2795 fathoms), while in the adjoining Sulu Sea, with about the same depth, the temperature is 10.3° below 400 fathoms. In the Gulf of Mexico and the Caribbean Sea a uniform temperature of 4.2° is found below 900 fathoms, and in the Mediterranean, with a depth of less than 200 fathoms in the Strait of Gibraltar, the temperature from about 270 fathoms to the bottom is 13°.

The Bottom of the Sea is different in many respects from the surface of the land. The mantle of sea water protects it from subaërial disintegration and erosion which gives such a varied shape to the landscape, and although sea water may decompose the bottom of the ocean, there are no currents strong enough to transport the residue to distant regions. While the land surface is constantly reduced by denudation, the bottom of the sea receives constant accessions. The materials which contribute to this process are either of continental or pelagic origin. The first are either such as the ceaseless actions of the waves remove from exposed parts of the coast or material brought down to the coast by the rivers. The currents carry these materials out to sea, and while the heavier ones, such as gravel and coarse sand, remain near the shore, the lighter ones, as fine sand, silt and mud, are transported to considerable distances before they sink to the bottom. In this way the coast is lined with a fringe of continental deposits which may be quite narrow, but often attains a width of 100 miles or more. This fringe is designated as continental shelf; when broad it has a moderate slope, and is generally assumed to terminate with the 100 fathom curve. It is succeeded by a well defined steeper slope called the continental slope. Continental or terrigenous deposits are often found at considerable distances from the coast, disconnected from the shore deposits; in such cases they are formed by conflicting currents losing their velocity and depositing the sand and silt which they carry. These deposits, called sand banks, often constitute dangers to navigation. In the higher latitudes melting icebergs and floes produce banks; in this way the large Newfoundland Banks, 270 miles wide, are supposed to have been formed.

The finest terrigenous material, designated as mud, is carried to sea far beyond the 100 fathom limit, and in the shape of blue, red, green, volcanic and coral mud, covers about one seventh part of the ocean's bottom to depths of over 1,000 fathoms. These "muds" also cover the bottom of the large continental basins with the exception of the Gulf of Mexico and Caribbean Sea, and prevail in the Arctic Seas. The continental slope generally descends very gently from the "shelf" to the trough of the sea, but there are instances of quite steep descent; such are met with off the west coast of Europe, Africa, Mexico and South America, also near volcanic and coral islands. But the bottom of the deep troughs and basins nearly everywhere presents the profile of the dead level of a vast plain. Although animal life presents its contribution to the continental deposits in the shape of broken shells of mollusca, etc., they occupy only an accessory position, and it is in the deeper parts of the ocean that they constitute the principal

component. Globigerina ooze, composed mainly of the microscopic shells of a genus Foraminifera, covers over one third of the ocean's bottom, it prevails in the medium depths and especially where there are warm currents, like the Gulf Stream. The largest area is found in the Atlantic Ocean; it predominates in the northwestern part of the Indian, but is restricted to the Polynesian Plateau in the Pacific Ocean. A variation of this ooze, which contains large proportions of mollusca shells, principally those of Pteropods, is called Pteropod ooze, and is found on the central ridges of the Atlantic, in depths not exceeding 1,400 fathoms, and also in the Gulf of Mexico and Caribbean Sea. The red clay occupies the greater depths of the ocean, and a larger area than any other deposit, more than one fourth of the earth's surface. It is a genuine clay and assumed to be the result of the decomposition of pumice and other volcanic materials. The absence of shells in this deposit is not thought to be proof of the absence of animal life; apparently the shells have been dissolved by the free carbonic acid of the sea water and absorbed by the latter before reaching bottom. In some of the deepest parts of the Indian and in the eastern Pacific, silicious radiolarian remains are found in such quantities in the red clay that this kind of deposit has been designated radiolarian ooze. See OCEAN CURRENTS; OOZE.

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Ocean Cables. See CABLES, SUBMARINE.

Ocean Currents. The surface of the ocean is very rarely in a state of perfect rest. We make a distinction between vertical and perceptible horizontal motion; the latter we call *currents.* Near the coast, in channels and estuaries, the currents are referred to a variety of causes, among which the tides are the most important, but in the open sea the winds are recognized as the primary cause of all the great currents. A regular and continuous wind blowing over the surface of the ocean will induce motion in its surface, but the velocity communicated to the water is always far less than that of the air producing it. In consequence of the viscosity of the water the motion of the surface will be transmitted in part to greater or less depth but generally diminishing rapidly below the surface. The rate of this motion in a body of water and the depth to which it penetrates are altogether a question of time, and it has been demonstrated that if the winds act continuously upon an unconfined ocean the entire body of water from surface to bottom will have motion imparted to it. Furthermore, the momentum acquired by the water in motion will carry it on in its course for a considerable time with slowly diminishing velocities, should the wind cease to blow.

The trade winds are those which in the Atlantic and Pacific oceans blow with great regularity all the year round on both sides of the equator in the Northern hemisphere from the northeast and in the southern from the southeast. In the Atlantic the southeast trades are the prevailing winds between the Cape of Good Hope and Rio de Janeiro to the equator, the northeast trades between lat. 12° N. and about lat. 30° N. The two regions are separated by a region of light changeable winds and calms called the equatorial calms or doldrums. The trade winds induce currents on the ocean's surface called the North and South Equatorial Currents respectively. Their limits approximate those of the corresponding trade winds; the northern lies between lat. 10° and 28° N. and has a mean velocity of 14 miles per day, the southern between lat. 15° S. and the equator and has a mean velocity of 16 miles per day. The South Equatorial Current from about lon. 20° W. passes north of the equator; this may be due partly to the southeastern trades which extend into the Northern hemisphere and partly to the configuration of the South American coast which compels the current to take a northwesterly course. It finally enters the Caribbean Sea through the different passages among the Lesser Antilles; a small portion, however, separates from the main body and moves south, following the South American coast. Between the two Equatorial Currents we find the Guinea Current which belongs to a secondary class, called compensating currents, which always run in an opposite direction to the primary, and are explained by a natural tendency of the water to restore equilibrium disturbed by the primary current. The Guinea Current commences about 35½° W., attains a velocity of 15 miles, and on reaching the coast of Africa near Cape Palmas, passes into the Gulf of Guinea. One part of the waters which the North Equatorial Current conveys to the American shores enters the Caribbean Sea and joins those of the South Equatorial; the other part moves along the Bahamas toward the northwest. The waters which the Equatorial Currents carry into the Caribbean Sea are assumed to acquire their motion partly from the impulse of the trades, partly in consequence of the prevailing easterly winds and to pile up against the western shores. Very little doubt is entertained at present that the current through the Strait of Yucatan into the Gulf of Mexico, which is one of the strongest on record (from 60 to 120 miles per day), is solely due to the difference of level between the Caribbean Sea and the Gulf. But these waters do not tarry in the Gulf of Mexico, its level being in turn higher than that of the Atlantic; they are, consequently, forced toward the Strait of Florida where they find an outlet, enter the Atlantic as the celebrated Gulf Stream, a name first used by Franklin. In the narrowest part of the channel, off Cape Florida, it approaches the coast to within 15 miles, occupies the entire width (40 miles) and depth (482 fathoms) of the channel and attains velocities of 69 to 100 miles per day at the surface. By calculation it has been shown that a current of the velocity of the Gulf Stream requires a difference of elevation of at least 0.7 feet of the Gulf over the Atlantic, which difference agrees very nearly with that found by direct leveling across the Florida Peninsula. After leaving the Straits, the Gulf Stream moves to the northward over a rocky bottom with a depth of 460 to 270 fathoms, and distant from the coast about 100 nautical miles. In lat. 34° it enters the deep water of the ocean, when off Cape Hatteras, it again approaches the coast, being distant only 35 miles and in depths of over 1,500 fathoms. Its temperature there is between 31° C. in summer and 26° C. in winter, having lost only about 3° since

leaving the Straits of Florida. It is readily recognized by its high temperature and dark blue color, its western edge being especially well defined. It is not a deep current; at the depth of 250 fathoms its temperature is 10° C., under its western edge it is 7.2°, while under its eastern edge a temperature of 15.6° is found. This appears to indicate that it moves over a wedge of cold water which comes from the north and west and descends toward the east into the depths of the ocean. The width of the Stream off Hatteras is about the same as in the Straits of Florida, 40 miles, and its velocity is between 50 and 73 miles per day. After leaving Cape Hatteras it gradually changes its northeast direction into due west with constantly diminishing velocity and temperature until it reaches the southern edge of the Banks of Newfoundland which it does in summer in lat. 42½° N. and in winter in 41½° N., with temperatures of 22° C. and 10° C. respectively and velocity of 24 to 30 miles per day. It is here no longer considered as an ocean current but a drift, and is called the Gulf Stream drift. The deflection of the Gulf Stream toward the east is attributed partly to the rotation of the earth and partly to the direction of the prevailing winds. While the central part of the Gulf Stream drift makes its way toward the western shores of Europe and moderates their climate, one part enters Davis Strait and produces an open channel to the southern part of Baffin Bay during winter; another one passes into Denmark Strait between Iceland and Greenland, but it soon sinks into the depths of the sea. A more persistent branch passes between Iceland and the British Islands and the coast of Norway, and has been traced to the eastward as far as the west coasts of Spitzbergen and Nova Zembla during the summer season. The southern part of the Gulf Stream drift, more properly called Atlantic drift, leaves the main body south of the Azores and, as the North African Current, follows the coast of Africa to Cape Blanco where it joins the North Equatorial Current. The vast oval-shaped area enclosed by the North Equatorial Current, the Gulf Stream and the Gulf Stream drift is one of calms and weak drifts, and is called the Sargasso Sea from the sea-weed which accumulates about its borders.

Turning to the currents that descend from the polar region into the Temperate zone, we find in the removal of vast bodies of water from the western part of the ocean to the eastern by the Gulf Stream the cause of other currents, compensating currents, whose function it is to move waters in the opposite direction, from the northeast to the southwest, for the purpose of restoring equilibrium, as in the Labrador current. The prevailing northwesterly winds in Baffin Bay assist such a movement along the coast of Labrador and Newfoundland to the southward, and this direction is maintained until Cape Race has been passed where it is changed to southwest on account of the rotation of the earth. This current is active during the season of melting ice. Field ice generally appears on the Banks as early as February and disappears about the end of May. Icebergs are most abundant in May and are found in diminishing numbers until the end of August. The majority of bergs come from the west coast of Greenland (some few come from Frobisher Sound and Hudson Strait), and move at the rate of about 10 miles per day. Similar conditions to those existing in Baffin Bay produce a southerly current along the east coast of Greenland, called the Greenland Current, which rounds Cape Farewell and turns to the northward toward the depression which the Labrador Current has created in Baffin Bay. After skirting the ice barrier which usually exists in Davis Strait in the spring, it merges into the Labrador Current. The temperature of these currents is very low, but their density is comparatively high for the reason that they are shallow and rest on warm and heavy waters and have been constantly gaining salt during their progress. Being comparatively heavy the Labrador Current sinks under the Gulf Stream. The cold waters which extend along the western edge of the Gulf Stream as far as Cape Florida have sometimes been considered a continuation of the Labrador Current, but it appears that the movement of these waters toward the southwest is extremely slow and disguised by the more powerful motion produced by the winds and tides. Furthermore, the movement of this littoral band is retarded by warm currents making their way into the Gulf of Saint Lawrence and Gulf of Maine. In conformity with the laws of oceanic circulation as now understood, the waters of the Labrador Current as well as the cold waters of the coast regions pass beneath the edge of the Gulf Stream (which is very thin) and continue to sink and move along the slope of the continental plateau as they drift slowly southward until they reach the bottom of the ocean with a temperature of 2.2°. The existence of a cold wall along the western edge of the Gulf Stream and cold bands within its limits, which were discovered by the early Gulf Stream explorations and which have since been denied and reaffirmed, can hardly be considered as permanent features; similar bands are often noticed in thin superficial currents and are the consequence of underlying cold water being forced to the surface either by lateral pressure or by the sinking of the warm water by reason of evaporation or loss of heat.

That part of the South Equatorial Current which turns to the southward off Cape San Roque, called the Brazilian Current, is quite weak, having a velocity less than 20 miles per day; off the Falkland Islands it is joined by the Cape Horn Current which comes from the southern Pacific and crosses the South Atlantic. When off Cape of Good Hope this "Westwind drift" turns to the northward and as a cold current, the Benzuela Current, flows along the west coast of Africa with a velocity of 12 to 20 miles per day. Off the mouth of the Kongo it turns to the westward and joins the South Equatorial.

The currents of the Pacific are similar to those of the Atlantic. The North Equatorial has its origin near the Revillagigedo Islands off the coast of Mexico, in lon. 110°, flows between the lats. of 10° N. and 20° N. in a westerly direction across the entire width of the ocean to the Philippines, about 7,500 miles, with a velocity of 12 to 18 miles per day. The South Equatorial extends from lat. 15° S. to the equator and has its greatest velocity near its northern edge. It has a mean velocity of 24 miles per day, but this is often more than doubled in the eastern part. In the neighbor-

hood of the Fiji Islands it divides, one part, the northern, known as the Rossel Current, passing through the various passages among the Polynesian Islands toward Torres Strait and the north coast of New Guinea; the southern branch, called the Australian Current, trends toward the east coast of Australia with a velocity of 24 miles, but gradually loses strength and is deflected toward the southeast. The Equatorial Counter-Current, setting toward the east, commences at Mindanao in the Philippines and extends to the Bay of Panama and is especially strong during the period from June to October. The Japan Current, or Kuroshiwo, is a continuation of the North Equatorial and is the Gulf Stream of the Pacific. Starting from the east coast of Luzon, it passes the east coast of Formosa; changing its course to the northeast, and makes for the southwestern point of Japan. Off this point the current divides, the major portion passes through Van Diemen Strait and the passages between the Linschoten Islands, and runs parallel to the south shores of the Japanese Islands, attaining its greatest velocity of 48 to 72 miles per day. It leaves the coast of Japan after having reached Cape Maboye, to the eastward of Yokohama, and turns to the northeast, like the Gulf Stream off Cape Hatteras, without, however, reaching beyond the latitude of 40° N. One branch of the Kuroshiwo parts from the main stream before Van Diemen Strait has been reached, enters the Japan Sea through the Korea Channel and follows the west coast of Japan to La Perouse Strait, through which it passes into the Okhotsk Sea and flowing along the west shores of the Kurile Islands it can be traced to the west shore of Kamchatka Peninsula. The strength of the Kuroshiwo is greatly influenced by the winds of the western Pacific; during the summer months, between the middle of May and the beginning of October, the southwest monsoon blows on the coast of China to lat. 25° N., and is followed during winter by the northeast monsoon which retards the stream, hence it has its greatest strength in August and its least in March when it is hardly recognized as a warm stream. It is an open question whether a branch of the Kuroshiwo enters the Bering Sea. The currents here are so feeble and so much influenced by the winds and tides that their record does not convey any definite information; but from the fact that the southwestern, or deeper, part of this sea is always free of ice while the northeastern, or shoaler part, during the winter months is covered with an impenetrable mass of ice we may safely conclude that warm water from the Pacific enters the sea, if not as an active current, at least as a powerful drift. In confirmation of this supposition we find in the deeper parts of the sea during August a mean surface temperature of 7.4°, at the depth of 100 fathoms a minimum of 2.9°, at 200 fathoms a maximum of 3.4°, and at 1,000 fathoms 1.9°, with salinity increasing regularly from surface to bottom. The breaking up of the ice for some distance northward of Bering Strait indicates that a portion of the current passes through the strait. In lon. 150° W. the Kuroshiwo can no longer be considered a warm current, it thence gradually assumes a more southerly direction and passes the coast of California as a cold current, the California Current, and finally merges into the North Equatorial in about lon. 130° W. The east Australian Current, corresponding to the Brazilian of the Atlantic, is regarded as a warm current; it has a width of 40 miles, with its inner edge about 20 miles off shore, and shows velocities of from 12 to 72 miles. South of Tasmania and New Zealand we find the same westerly winds and easterly drift that we noticed in the South Atlantic. On reaching the South American coast a branch of this drift turns to the northward past the coast of Chile and Peru and joins the South Equatorial southward of the Galapagos Islands. This current has a velocity of only 15 miles and is generally supposed to produce the comparatively low temperatures prevailing along the west coast of South America, but these are more correctly attributable to the cold water which rises from the bottom to the surface near the coast. There are no arctic currents in the Pacific on the grand scale of the Labrador, no icebergs, and the ice in Bering Sea is not very compact. In fact the trips over the ice by the natives of both Asia and America in the depth of winter to visit their kinsfolk on Diomed Island, in the middle of Bering Strait, are considered hazardous ventures. The ice in winter extends from Bristol Bay to some miles to the northward of Saint Paul Island, thence northwest to Cape Navarin, in the summer months, August, September and early October the arctic pack ice extends from Icy Cape on the coast of Alaska to Herald Island. Floating ice is found as far south as 35 miles to the southward of the Pribilof Islands and to about 60° lat. off the coast of Kamchatka. Along this coast there is a cold current in spring and early summer, this is reinforced by cold water which by strong tidal currents may reach the eastern shores of the Kurile Islands through Amphitrite and other straits from Okhotsk Sea. This cold current, the Kurile Current, carries quantities of arctic ice, and is noted for its low temperatures from surface to bottom. It follows the east coast of Japan as far as Van Diemen Strait, is interposed between the shore and the Kuroshiwo and is known as Oya Siwo (green water).

The Indian Ocean shows different conditions from those of the two other great oceans for the reason that its northern limit is within the Torrid zone. During the summer months the southeast trade winds pass the equator and are changed into southwest winds or southwest monsoon. During the rest of the year, from October to April, the northeast monsoon, which corresponds to the northeast trade winds of the other oceans, blows over the northern part of the ocean. During this period the currents north of the equator have a northwesterly direction, attaining especially great velocities off Ceylon (80 miles) and the east coast of Africa. During the southwest monsoon the water north of the equator moves in the opposite direction, from west to east toward Sumatra, and again attains its greatest velocity off Ceylon. In the Southern hemisphere between the latitudes of 7° and 20° S. the Equatorial Current flows to the west during the whole year with velocities of between 12 and 36 miles, sometimes as much as 60 miles. Off the east coast of Madagascar the current divides into a northern and southern branch. A part of the northern branch turns to the northwest, reaching the Bay of Zanzibar during the southwest monsoon

and turning into the Equatorial Counter-Current during northeast monsoon. The other part rounds the northern Cape of Madagascar with velocities of 18 to 48 miles and enters the Mozambique Channel as the Mozambique Current. During the northeast monsoon the Equatorial Counter-Current is found between the equator and lat. 7° S. with velocities of from 12 to 18 miles. Its function is to restore the equilibrium by carrying back part of the waters removed by the Equatorial Currents from the eastern part of the ocean. During the southwest monsoon the eastern flow extends over the whole ocean north of lat. 5° S., with velocities of more than 48 miles at the equator. The Agulhas Current is a continuation of the Mozambique Current; it has a velocity of 46 to 51 miles and off Cape of Good Hope meets the cold waters from the vicinity of Cape Horn. The collision of the two currents produces streaks of alternate warm and cold water, differing 8° or more in temperature, a feature which has attracted the attention of many navigators.

The most noticeable feature of the currents in the Arctic Ocean is the almost universal eastward and southeastward set north of the American Continent and the generally westward set north of Siberia, although at a considerable distance from the mainland. Both currents seem to originate north of Bering Strait, and the fact that they set out from this locality in nearly opposite directions has suggested the existence of a large island or continent between the Pole and Bering Strait.

In the Antarctic regions, or rather those to the southward of Tasmania, Cape Horn and the Cape of Good Hope, the drift is generally from west to east, in conformity with the prevailing westerly winds.

In conclusion it may be of interest to notice one or two currents which in a strict sense may not be considered ocean currents but which may explain the function of difference of density in the production of currents. In the Mediterranean we have noticed a higher density in consequence of evaporation than is possessed by the adjoining ocean. In consequence of this difference there is a surface inflow of ocean water with a velocity of 48 to 72 miles and an undercurrent of the denser water into the ocean. On the other hand the density of the Baltic is less than that of the adjoining North Sea, hence we have a surface current from the Baltic into the North Sea and an undercurrent in the opposite direction.

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Ocean Grove, N. J., town in Monmouth County; on the Atlantic Ocean, and on the Central of New Jersey and the Pennsylvania Railroad; about 30 miles south of New York. It is a famous summer resort on account of its fine beach and the ease of access from New York, Philadelphia, and other cities. It adjoins Asbury Park (q.v.); Wesley Lake is on the boundary. The Ocean Grove Camp Meeting Association of the Methodist Episcopal Church controls the town, and regulates its laws. The sale of intoxicants and tobacco and theatrical performances are prohibited. The Sunday laws are strict and rigidly enforced. The prominent buildings are the Auditorium, which seats 10,000 persons, cost $75,000, and was dedicated 9 Aug. 1894; the public school building, and the post-office. Religious meetings are held in the Auditorium. The school building, called the Neptune Township High School, cost $72,000. The association owns and operates the electric light plant and the waterworks. The association was organized in 1869; but the first permanent building was not erected until 1875, a wooden frame covered with green boughs was its appearance when first used. In 1874 a stand for the speakers had been erected, and the audiences sat on temporary seats made by placing planks on trestles. There are (1904) large hotels and boarding houses and a large number of summer cottages. In the summer months the population varies from 20,000 to 30,000. Pop. (1890) 2,754; (1900) 4,251.

Oceana, ō-shē-ā'na, or **England and Her Colonies,** a work of travel by James Anthony Froude, published in 1886. This is the record of a journey made by the author via Cape Town to Australia and New Zealand, and home by way of Samoa, the Sandwich Islands, San Francisco, Salt Lake, Chicago, and New York, in 1884–5.

Ocean'ic Life. See BENTHOS; DEEP SEA EXPLORATION; FISHES, GEOGRAPHICAL DISTRIBUTION OF; GLOBIGERINA OOZE; PLANKTON; SEAWEEDS; ZOOGEOGRAPHY; etc.

Oceanica, ō-shē-ăn'ĭ-ka, or **Oceania,** the name given to the land division of the world which is composed of islands in the Pacific Ocean. The limits of Oceanica are not well defined; some geographers include in this division all the oceanic islands in the Pacific, others include the East Indian Archipelago. A subdivision of Oceanica adopted by many is into Western Oceanica or Malaysia, corresponding with what is better known by the name of the Malay Indian or East Indian Archipelago, Micronesia or Northern Oceanica, Polynesia or Eastern Oceanica, and Melanesia or Southern Oceanica. The islands and peoples of Oceanica will be found described under their respective titles.

Oceanids, in Greek mythology, a class of nymphs, daughters of Oceanus and Tethys.

They were 3,000 in number, and were said to have an equal number of brothers. See MYTHOLOGY.

Oceanus, ō-sē'a-nŭs, in Greek mythology, the eldest of the Titans, and a personification of the sea. He was called the son of Gæa (the earth) and of Uranus (heaven). Oceanus and Tethys were the parents of rivers, and of the race of goddesses called Oceanids (q.v.). According to another account he was the father of all gods and men. The physical idea attached by the Greeks to the term Oceanus, was that the earth was a flat circle surrounded by a river (Oceanus), out of which the sun and stars were supposed to rise and set, and on whose banks were the abodes of the dead. The term ocean was thus applied especially to the Atlantic, or sea beyond the Pillars of Hercules, in contradistinction to the Mediterranean or internal sea.

Ocel'lus, a structure found in various groups of invertebrate animals, consisting of a spot of pigment enclosed in a capsule or cavity, generally supplied with nerve-filaments, and to which the function of sight is attributed. See EYE.

Ocellus Lucanus, ō-sĕl'ŭs lū-kā'nŭs, a Pythagorean philosopher: b. Lucania, Italy, 5th century B.C. His works are: 'On Law'; 'On Kingly Rule and Piety'; and 'On the Nature of the Whole' (*Περὶ τῆς τοῦ παντὸς φύσεως*) the last of which is the only one of his treatises now extant, excepting some fragments found in Stobæus, written in Doric. 'On the Nature of the Whole' is in Ionic, which fact leads some critics to doubt its authenticity. It is divided into four chapters, in which the author maintains that the whole, that is, Nature, the Universe, has no beginning nor end, and that men have always existed. Consult: Mullach, 'Fragmenta Philosophorum Græcorum' (1860); Taylor, 'Ocellus Lucanus,' translated into English (1831).

Ocelot, ō'sĕ-lŏt, a tropical American wildcat (*Felis pardalis*), averaging about three feet in length exclusive of the tail, and about 18 or 20 inches tall. Its body color is a variable and handsome fawn or grayish-brown, marked with lines of blackish ring-spots. The ocelot ranges northward as far as Louisiana, and is found in forests, where it preys largely upon birds. It is commonly seen in menageries, and in Mexico is often found in a semi-domesticated condition about farm-houses.

Ochakof, ŏ-chä'kŏf, or **Otchakoff,** Russia, a town in the government of Cherson, on the black Sea, at the mouth of the Dnieper, formerly an important Turkish fortress, with a citadel, the walls of which were 25 feet high. In 1737 it was stormed by the Russians, who lost 18,000 men in the attack. The Turks attempted to recover it with a force of 70,000 men, but were repulsed with the loss of 20,000. In 1738 it was given up by the Russians, who had previously destroyed the works. The Turks fortified it anew in 1743, and held it until 1788, when, after a siege of six months, it was stormed by Suvaroff, who razed it to the ground. By the Peace of 1792 it was ceded to Russia. It has modern fortifications, and some coasting trade. Pop. (1897) 10,784.

Ochil Hills, Scotland, a mountain range on the borders of Perth, Clackmannan, Kinross, and Fifeshire; average breadth, about 12 miles; highest summit, Bencleuch, in the southwest, about 2,300 feet above sea-level. The Ochils are of basalt and greenstone, and contain copper and iron ores.

Ochre, ō'kẽr, or **Ocher** (Greek, "yellow," "yellowish green," "pale"), friable clay with an admixture of iron oxides, giving it a color varying from yellow to red, as the iron peroxide is hydrated (yellow) or anhydrate (red). The reddish color may be deepened artificially by burning. Rarely manganese takes the place of iron in the composition of ochre, or occurs in addition to iron, the brownish variety thus formed being called "Sienna" (from its famous source in Italy) or "umber" (Latin, *umbra,* "shade"). The coloring of these two shades again is deepened by their being burnt. Umber and sienna are largely found, outside of Italy, in New York, Pennsylvania, Missouri, and Tennessee; and the leading States in the production of ochre are Pennsylvania, Georgia, California, and Vermont. But the United States produces less ochre and iron oxide pigments than France or Germany. Until recently the home product was inferior to the foreign, being only 50 per cent pure, a fault now remedied by specially designed crucible furnaces, which insure the purity of the increased output. The best yellow ochre is that coming from Oxford, England.

Och'ro, same as Okra (q.v.).

Ochs, ŏks, **Adolph S.,** American publisher: b. Cincinnati, Ohio, 12 March 1858. His early life was that of a country lad, and he obtained a common school education at Knoxville, Tenn., where for a year he served as carrier and newsboy. In 1871 he was grocer's clerk at Providence, R. I., attending a night school meanwhile. He then returned to Knoxville, where he was a druggist's apprentice for a year and then a printer in 1873. In 1878 he became publisher of the Chattanooga *Times,* where his ability was distinctly shown. In 1896 he secured a chief interest in the New York *Times* and as its publisher developed its resources; his purchase of the Philadelphia *Times* and the *Public Ledger* followed in 1902.

Ochtman, äk'mạn, **Leonard,** American artist: b. Zonnemaire, Zeeland, Holland, 21 Oct. 1854. He settled in Albany with his family in 1866, and became a draughtsman in an engraving office; had a studio at Albany for two years and subsequently took a winter course at the Art Students' League, New York. As a landscape painter he is self-taught, but has traveled through England, France, and Holland for the purpose of study. His power and skill are shown in such paintings as 'Night on the Mianus River'; 'Autumn Moonlight'; 'Moonlight Night in Spring'; 'A Morning Symphony.' Vivid color, depth of imagination and breadth of treatment characterize his paintings whose truthfulness reveals a genuine love of nature in their author.

Oc'imum, a genus of plants. See BASIL.

Ocmulgee, ŏk-mŭl'gē, a river in Georgia which has its rise north of the central part of the State, flows south, southwest, and east, uniting with the Oconee to form the Altamaha. It flows through an agricultural region; its length is about 260 miles. The upper course has many

rapids and small cascades, and the lower course is through a more flat country, covered with pine forests. It is navigable for small steamers for about half its distance from the mouth, to Macon (q.v.).

Oconee, ō-kō'nē, a river in Georgia which has its rise in Hall County, flows southeast and unites with the Ocmulgee to form the Altamaha. It is navigable for about 100 miles from its mouth. Milledgeville, the capital of the State, is on the Oconee.

O'Connell, ō-kŏn'ĕl, **Daniel,** Irish patriot: b. Cahir, County Kerry, Ireland, 6 Aug. 1775; d. Genoa, Italy, 15 May 1847. He studied in France at the colleges of Saint Omer and Douay, and in 1793, on his return home, began the study of law. In 1798 he was admitted to the bar, and soon began to distinguish himself both by legal skill and oratory. After a speech made at Dublin in the beginning of 1800, at a meeting held to petition against the union, he was regarded as one of the most promising and energetic of the Catholic leaders. The question of Catholic emancipation being seriously agitated, he was active in every attempt to remove the national grievances, and in 1824 founded the Catholic Association which carried on active agitation in spite of government measures against it. The chief grievance was that Catholics could not sit in Parliament without taking an oath contrary to conscience; in 1828 O'Connell took a decisive step by becoming candidate for Parliament in the county of Clare; he was elected but could not take his seat because he refused to take the preliminary oath. His election, however, was a fact that could not be ignored, and as the feeling in favor of emancipation continually increased, the ministry with the Duke of Wellington at its head decided they must concede it, or risk a civil war. In 1829 therefore the Catholic Emancipation Bill was passed, and under its provisions O'Connell took his seat, and became the leader of the Irish party in the House of Commons. While carrying on this agitation he could hardly avoid making a considerable sacrifice of his practice as a lawyer, and was for many years the annual recipient of a large sum contributed by his countrymen. In 1842 he began the agitation for the repeal of the union between Great Britain and Ireland, holding monster meetings at which he was the chief speaker; in 1843 he was arrested on a charge of conspiracy and sedition; he was convicted and sentenced to fine and imprisonment, but the House of Lords reversed the judgment on 4 Sept. 1844. He then resumed his seat in Parliament, but his influence was lessening as a new Irish party had arisen — called Young Ireland — which advocated more radical measures, and did not favor O'Connell's «moral force» policy; in 1846 he supported the Whig ministry which still further alienated him from the younger party. His health was failing, and in 1847 he went to Italy, intending to visit Rome, but died at Genoa. He was a most eloquent and forceful speaker, and a leader greatly beloved by his people.

Consult: Cusack, 'The Liberator, his Life and Times' (1872); Dunlop, 'Life of Daniel O'Connell'; Fitzpatrick, 'Correspondence of Daniel O'Connell' (1888); McCarthy, 'History of Our Own Times'; O'Connell (his son), 'Life and Times of Daniel O'Connell' (1846); Wendell Phillips, 'Daniel O'Connell.'

O'Connor, ō-kŏn'ŏr, **Arthur,** Irish political leader: b. Mitchelstown, County Cork, Ireland, 1763; d. near Nemours, France, 25 April 1852. He was admitted to the bar in 1788, was elected to the Irish Parliament, and as a member of the United Irishmen served as one of their directory of five, in consequence of which he was tried for high treason, but finally discharged. He went to France and on his return to Ireland was again arrested, but made his escape and entered the service of Napoleon, who made him a lieutenant-general in 1804 and later general of division. He published: 'Letters to Earl Camden' (1798); 'The Present State of Great Britain' (1804); etc.

O'Connor, Feargus Edward, Irish political leader: b. near Cork, Ireland, 1796; d. in an insane-asylum 30 Aug. 1855. He was educated at Portlarlington and Trinity College, Dublin, and was admitted to the bar. In 1832 he sat in Parliament for Cork and at first supported O'Connell, but later advocated more vigorous methods in reforms for the working-classes, and an estrangement followed. He founded the Chartist party and edited, at Leeds, in its interest, the 'Northern Star.' He was returned to Parliament for Nottingham in 1847, and presented to the House of Commons the famous monster petition for a national charter. He became hopelessly insane in 1852.

O'Connor, John, Canadian jurist: b. Boston, Mass., January 1824; d. Coburg, Ont., 3 Nov. 1887. He removed with his parents to Canada in 1828 where he was educated, and in 1854 admitted to the bar. He sat for Essex in the Canadian parliament 1867–72, and in the last named year was president of the council in Sir John Macdonald's administration. Later he was minister of inland revenue and postmaster-general, and became queen's counsel in 1873. In 1878 he was reappointed president of the council and in 1880 became a second time postmaster-general, was secretary of state for a time, and in 1881 re-assumed the office of postmaster-general. He was a commissioner for revising the statutes of Canada and Ontario, and in 1884 was appointed judge of the high court of justice of Ontario.

O'Connor, John Joseph, American Roman Catholic bishop: b. Newark, N. J., 11 June 1855. He was educated at Seton Hall College, in the American College of Rome, and in Paris, and in 1877 he was ordained to the priesthood. He has held important charges and in 1901 was consecrated bishop of Newark, N. J.

O'Connor, Joseph, American journalist: b. Tribes Hill, N. Y., 17 Dec. 1841. He was graduated from the University of Rochester in 1863 and though admitted to the bar in 1869 never practised. He was attached to the staff of the Rochester *Democrat and Chronicle* 1870–3; edited the Indianapolis *Sentinel* 1873–5; was editor of the Buffalo *Courier* 1879–85; and has been editor of the Rochester *Post Express* from 1886. He has published a volume of 'Poems' (1895); etc.

O'Connor, Thomas Power, Irish journalist and politician: b. Athlone 5 Oct. 1848. He entered journalism in Dublin, went to London in

1870, was for a time in the London office of the New York *Herald,* entered Parliament for Galway in 1880, and has represented the Scotland division of Liverpool from 1885. He founded and edited *The Star, The Sun,* and the 'Weekly Sun,' and later became editor of 'M. A. P.' (Mainly About People). His works include a biography of Beaconsfield.

Oconomowoc, ō-kŏn'ō-mō-wŏk, Wis., city in Waukesha County; on the Chicago, M. & St. P. railroad; about 25 miles west by north of Milwaukee. It is in the midst of a region of beautiful lakes, the largest of which are Belle and Fowler, and it is noted for the good fishing in the vicinity. Fertile farm lands are in this part of the State, and the industries of the city are connected chiefly with farm and dairy products. The city owns and operates the electric-light plant and the waterworks. Pop. (1890) 2,729; (1900) 2,880.

O'Conor, ō-kŏn'ŏr, **Charles,** American lawyer and politician: b. New York 22 Jan. 1804; d. Nantucket, Mass., 9 Feb. 1884. He studied law, was admitted to the bar at 20, and soon became one of the leading lawyers of the country; the Forrest divorce suit, the Slave Jack case (1835), the Lispenard will case (1843), and the Jumel case (1871) were the most important litigations he took part in before the great Tweed suits in which he acted for the prosecution with William M. Evarts and W. H. Peckham. O'Conor wrote 'Peculation Triumphant,' a record of the Tweed ring. A Southern sympathizer during the War, he went bail for Jefferson Davis together with Horace Greeley. In 1872 he was nominated for the presidency by the wing of the Democracy opposed to the nomination of Horace Greeley; he refused the nomination, but polled nearly 30,000 votes. In 1876 O'Conor acted as counsel for Samuel J. Tilden before the electoral commission.

O'Conor, John Francis Xavier, American educator: b. New York 1 Aug. 1852. He was graduated from St. Francis Xavier College in 1872, continued his studies in Europe, entered the Society of Jesus, and was ordained to the Roman Catholic priesthood in 1885. He has been a professor in West Park College, Georgetown University, Boston College, and St. Francis Xavier College, and has lectured on art, music, and Assyrian inscriptions. He has written: 'Lyric and Dramatic Poetry' (1883); 'Jesuit Missions in America' (1892); 'Christ, the Man of God' (1900); 'Education in the Schools of New York' (1901); etc.

Oconosto'ta, a Cherokee Indian chief: b. about 1708; d. 1810. He was one of the six delegates who in 1730 visited King George II. He was for many years an ally of the British, his one act of treachery being so severely punished that he ever afterward maintained their friendship. Oconostota in 1768 signed a treaty of peace with the Iroquois who had been his life-long enemies. He took no active part in the Revolutionary War, being infirm and a semi-invalid. He resigned his chiefship in 1782 in favor of his son. See CHEROKEES.

Oconto, ō-kŏn'tō, Wis., city, county-seat of Oconto County; at the mouth of the Oconto River, on Green Bay, and on the Chicago, M. & St. P. and the Chicago & N. W. R.R.'s; about 30 miles north by east of the city of Green Bay. It was settled in 1850 and in 1882 was incorporated. It is in an agricultural and lumber region and has considerable trade in farm and dairy products, also in fish and lumber. Its chief industrial establishments are flour and lumber mills, canneries, creameries, a brewery, and a wagon factory. It has a good public library, a high school, court-house, and a number of fine residences. Pop. (1890) 5,219; (1900) 5,646.

Oco'tea, a genus of tropical trees of the mountain-laurel family (*Lauraceæ,* q.v.), the wood of which is strongly and usually disagreeably scented. Prominent species are the stinkwood (*O. bullata*) of the Cape of Good Hope; til-wood (*O. fœtens*) of Madagascar, and the cinnamon-yielding *O. cuplularis* of Mauritius. Some of these trees yield valuable timber.

Ocracoke (ō'krą-kōk) **Inlet,** on the coast of North Carolina, between the islands of Portsmouth and Ocracoke, and forming a passage from the Atlantic into Pamlico Sound. Just at the western end of the inlet is a lighthouse, and on each side are dangerous shoals. Cape Hatteras is about 20 miles northwest.

Oc'rea, among the ancient Romans, a legging covering the foreleg from the knee to the ankle. It was made of tin, bronze, or other metal, modeled to the leg of the wearer, and fastened behind by straps and buckles, and generally richly ornamented.

Oc'tagon, in geometry, a polygon of eight angles or sides. A regular octagon is an octagon all of whose sides and angles are respectively equal to each other. See GEOMETRY.

Octahe'drite, dioxid of titanium in the crystal form, so called because of its tetragonal crystallization; sometimes styled *Anatase.* Its chemical composition (TiO_2) is that of the amorphous rutile and Brookite. Octahedrite is yellow, brown, gray, blue, or black; has a quasi-metallic lustre; is unaffected by acids and infusible with blowpipe; becomes incandescent if gradually heated; has a density of 3.83 to 3.93; and a hardness of 5.5. It occurs in the granite fissures of Switzerland, of Dauphiné at Bourg d'Oisans (whence the French name Oisanite), of the Brazilian diamond fields, and in the United States in Burke County, N. C., and Smithfield, R. I.

Octahe'dron, in geometry, a solid contained by eight equal and equilateral angles. It is one of the five regular bodies. See GEOMETRY.

Oc'tans, the "Octant," in astronomy, the constellation surrounding and including the South Pole of the heavens, and one of the 14 added to the heavens by Lacaille in connection with his work at the Cape of Good Hope.

Oc'tant, in astronomy, an instrument, is the eighth part of a circle divided into degrees, and used in calculating the amplitude of the stars, but is now little used.

Oc'tave, the eighth day after a festival, and the intervening days, all of which partake of the nature of the festival. In the Roman Catholic Church octaves are privileged and non-privileged, with many degrees and subdivisions of the former. The octaves of Easter and Pentecost are specially privileged. In the octave of Epiphany only the feast of patron saint, title or dedication of a church may be kept, and that not on the eighth or octave day, on which the

DECAPODS AND OCTOPODS

1870, was for a time in the London office of the New York *Herald,* entered Parliament for Galway in 1880, and has represented the Scotland division of Liverpool from 1885. He founded and edited *The Star, The Sun,* and the 'Weekly Sun,' and later became editor of 'M. A. P.' (Mainly About People). His works include a biography of Beaconsfield.

Oconomowoc, ō-kŏn'ō-mō-wŏk, Wis., city in Waukesha County; on the Chicago, M. & St. P. railroad; about 25 miles west by north of Milwaukee. It is in the midst of a region of beautiful lakes, the largest of which are Belle and Fowler, and it is noted for the good fishing in the vicinity. Fertile farm lands are in this part of the State, and the industries of the city are connected chiefly with farm and dairy products. The city owns and operat[illegible] the electric-light plant and the waterwo[illegible] Pop. (1890) 2,729; (1900) 2,880.

O'Conor, ō-kŏn'ôr, **Charles,** A[illegible] lawyer and politician: b. New Yor[illegible] 1804; d. Nantucket, Mass., 9 Fe[illegible] studied law, was admitted to the [illegible] soon became one of the leadin[illegible] country; the Forrest divor[illegible] Jack case (1835), the Lisper[illegible] and the Jumel case (18[illegible] portant litigations he [illegible] great Tweed suits i[illegible] prosecution with W[illegible] Peckham. O'Co[illegible] phant,' a recor[illegible] sympathizer [illegible] he went bail for Jefferson [illegible] with Horace Greeley. In 1872 [illegible] for the presidency by the [illegible] opposed to the nomi[illegible] Greeley; he refused the no[illegible]

Francis Xavier, American [illegible]

Octoste'ta, a Cherokee [illegible] b. [illegible] 1708; d. [illegible] the [illegible] of the six [illegible] 1730 [illegible] He [illegible] many years [illegible] of the [illegible] one [illegible] severely punished that [illegible] Occoneostota [illegible] a treaty of peace with the Iroquois who had been [illegible] He took no active part in the Revolutionary War, being [illegible] and a semi-invalid. He resigned his chieftainship in 1782 in favor of his son. See CHEROKEES.

Oconto, ō-kŏn'tō, Wis., city, county-seat of Oconto County, at the mouth of the Oconto River, on Green Bay, and on the Chicago, M. & St. P. and the Chicago & N. W. R.R.'s; about 30 miles north by east of the city of Green Bay. It was settled in 1850 and in 188[illegible] ated. It is in an agricultural a[illegible] and has considerable trade [illegible] products, also in fish a[illegible] industrial establishment[illegible] mills, canneries, crea[illegible] wagon factory. It [illegible] high school, cour[illegible] residences. Po[illegible]

Oco'tea, [illegible] mountain-l[illegible] wood of [illegible] ably s[illegible] wood [illegible] til[illegible]

[illegible]

Octahe'drite, [illegible]

Octahe'dron, in geometry a solid [illegible] tained by eight [illegible] lateral [illegible] of the five regular bodies. See GEOMETRY.

Oc'tans, the "Octant," in astronomy, the constellation surrounding and including the South pole of the heavens, and one of the [illegible] assigned to the heavens by Lacaille in connection with his work at the Cape of Good Hope.

Oc'tant, in astronomy, an instrument, is the eighth part of a circle divided into degrees, and used in calculating the amplitude of the stars, but is now little used.

Oc'tave, the eighth day after a festival, and the intervening days, all of which partake of the nature of the festival. In the Roman Catholic Church octaves are privileged and non-privileged, with many degrees and subdivisions of the former. The octaves of Easter and Pentecost are specially privileged. In the [illegible] of England only the feast of patron saint, [illegible] or dedication of a church may be kept, and [illegible] not on the eighth or octave day, on which the

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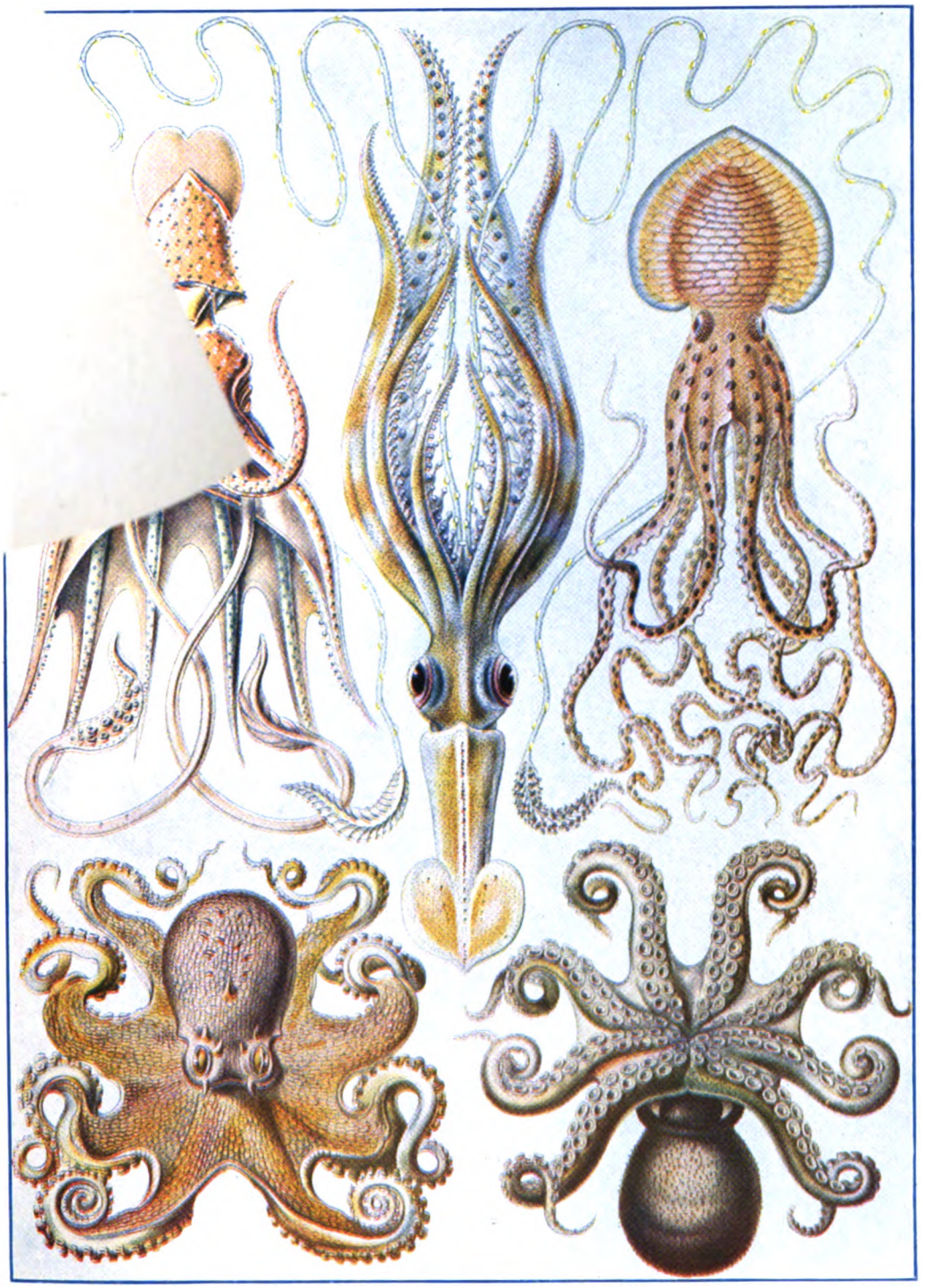

DECAPODS AND OCTOPODS

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services of the festival are to be repeated. In the Church of England the only festivals mentioned as having octaves are Christmas Day, Easter Day, Ascension, and Whitsunday. Dr. Sparrow, in the 'Rationale,' says that our whole life being spent in the revolution of seven days, the eighth or octave signifies eternity. On the other hand Du Cange declares that the eighth day denotes a finished solemnity, inasmuch as our Lord's resurrection took place on the eighth day, counting the period of his Passion as beginning on one Sunday, when he entered Jerusalem in triumph, and ending on the next, when he rose in triumph from the grave.

Octave in Music. See HARMONY.

Octa'via, Roman matron, wife of Mark Antony, the triumvir, and sister of Octavian, or Augustus: d. 11 B.C. She was married (before 54 B.C.) to Gaius Claudius Marcellus, who became consul in 50 B.C. Julius Cæsar, her great uncle, wished to divorce her from Marcellus so that Pompey might marry her and thus be as closely bound to him as he had been during the life of Julia, his first wife and Cæsar's daughter; but Pompey and Marcellus both objected. After Marcellus' death in 41, however, she was married to Mark Antony, thus cementing the bond between him and her brother Octavian, the future Augustus. Antony's passion for Cleopatra and his complete enslavement to her in spite of the remarkable beauty and matchless virtue of Octavia had much to do with precipitating the war between Antony and Octavian. She was actually divorced by Antony in 32 B.C., but cared tenderly for her children after his death. Her son by Marcellus was Marcus Marcellus, adopted by Augustus as his heir; he died prematurely in 23 B.C. bitterly bewailed by his mother and pathetically sung by Virgil in the sixth Æneid. Her daughters by Antonius became, respectively, the grandmother of Nero, and the mother of Caligula. The porticus Octaviæ, built in her honor by Augustus, enclosed the temples of Jupiter Stator and of Juno.

Octavia, Roman empress, wife of the Roman emperor Nero: b. 42 A.D.; d. Pandataria 62 A.D. A daughter of the emperor Claudius and of Messalina (thus a grand-daughter of Octavia, the wife of Antony); she married in 53 her cousin, Nero, then only 16. He was soon unfaithful to her, first leaving her for Acte, a freedwoman, and then for Poppæa Sabina, whom he married in 62, only 16 days after his divorce from Octavia. But Octavia's popularity was so great that Nero was forced to recall her to Rome, where she was so enthusiastically received as to rouse the jealousy of Poppæa. She was exiled to Pandataria on a false charge of infidelity, and was there killed by Nero's emissaries. A tragedy, telling her story and bearing her name, was long attributed to Seneca; its author may have been Curiatius Maternus, but it is still printed among Seneca's plays.

Octavianus. See AUGUSTUS.

Octa'vo, in printing, the size of a sheet of paper, which has been folded so as to make eight leaves; hence, applied to a book printed with eight leaves to the sheet. It is generally written 8vo, and varies in size according to the sizes of paper employed; as, foolscap octavo (or 8vo), imperial octavo (or 8vo), etc. See PAPER.

Octo'ber, the tenth month of the year, originally the eighth month in the Roman calender, whence its name, which it still retained after the beginning of the year had been changed from March to January. An old name in Germany for October was "wine month." It has long been in England the principal month for brewing. See CALENDAR.

October States, in American political history, certain States like Ohio and Indiana, whose elections were held in October instead of November. In presidential years these October elections had peculiar bearing on National results in November.

Octoic Acid, or **Caprylic Acid,** an organic acid having the chemical formula $C_8H_{16}O_2$, or $C_7H_{15}CO.OH$, and occurring, in the form of a glyceryl ether, in common butter, and also, in much larger quantities, in cocoanut oil. It may be obtained in the form of white crystals, which melt at 63° F. Octoic acid is almost insoluble in cold water, but dissolves in boiling water. Various isomers and compounds of the acid are known, but none are of any commercial importance.

Octop'oda, the eight-armed cuttlefishes. See CEPHALOPODA; OCTOPUS.

Oc'topus, a genus of the dibranchiate *Cephalopoda* (q.v.), or cuttlefishes, forming the type of the family *Octopodidæ,* the members of which group are familiarly known as "poulpes." These forms possess eight arms of equal length, united to each other by a web varying in extent in different forms. The arms possess two rows of sessile, wholly fleshy suckers. The prominent head is joined to the body by a distinct "neck," and the body itself is short, generally more or less rounded in shape, and unprovided with side or lateral fins. The shell is internal, and is represented by two short "styles," which lie imbedded in the "mantle." In the octopods the third right arm of the male animals becomes developed to form a "hectocotylus" or sexual organ (see ARGONAUT); and in some this modified arm is detached from the body and deposited within the mantle cavity of the female for the purpose of fertilizing the eggs, a fresh arm being developed as occasion requires.

The poulpes attained a popular notoriety from the tales which were formerly circulated of gigantic members of this group which had no existence in reality. Some forms spread their limbs 12 or 14 feet, like great spiders, and might, under favorable circumstances, hold under water a person whom they had seized until he had drowned, at the same time biting him with their horny parrot-like jaws; no doubt such accidents have occasionally happened to pearl-divers and the like. Ordinarily, however, the octopus does not attain one half these dimensions, and many species, as that which yields "cuttlefish bone," have bodies no larger than an ordinary pear. These animals live in rocky places along shore and about reefs, protecting their soft bodies by sitting in holes and crevices with arms reaching out to seize their victims, which are fishes and any animal they are able to overpower. They are themselves preyed upon by large fishes, turtles, etc. Many species are eaten

in various parts of the world, and the common one (*Octopus vulgaris*), of the Mediterranean and neighboring Atlantic coasts, has been speared and taken to market from a time immemorial, and is still a regular object of pursuit, especially in Italy. A deep-water species (*Eledone moschata*) is trapped for market in from 10 to 20 fathoms of water by lowering earthen jars and leaving them a few hours. The creatures creep into these jars, as a fine hiding-place, and allow themselves to be drawn to the surface. The flesh is eaten boiled, fried, and in salads, and is preserved by pickling. Sepia (q.v.) is the substance in the "ink-bag"; and "cuttlebone" the supporting calcareous plate beneath the skin of certain species. Of the American species *O. bairdii* and others of the eastern coast dwell in deep water or about the tropical coral reefs. On the Pacific coast several species are taken near shore and were always utilized by the Indians. Since the settlement of California their flesh is regularly supplied to the San Francisco market, where it is bought by Italians and Chinese. Some specimens brought in there are among the largest known, measuring 14 feet across the outstretched arms. Consult books of conchology, especially Cooke, 'Mollusca' (1895); and 'Standard Natural History,' Vol. I. (1884). See ARGONAUT; CEPHALOPODA; CUTTLEFISH.

Octopus, The, a novel by Frank Norris, published in 1901. It was the intention of its author to write a trilogy of novels which should symbolize American life as a whole, with its hopes, aspirations, possibilities, and problems. This book, which is the first of the three, has for its central motive Wheat, the great source of American power and prosperity, and also the literal staff of life. 'The Pit,' the second of the proposed trilogy, appeared in 1902, not far from the time of the author's death.

Octostyle, a term in architecture applied to a temple or portico having eight columns in front. The most perfect example was the Parthenon at Athens, a building of the Doric order. Few remains of Greek buildings of this style exist, the common practice having been to construct temples of the hexastyle or six-column order. Another notable example of the octostyle is the portico of the Pantheon at Rome.

Octroi, ŏk-trwä', or **Octroy,** an old French term particularly applied to the commercial privileges granted to a person or to a company. In a like sense the term is applied to the constitution of a state granted by a prince in contradistinction to those which are derived from a compact between the ruler and the representatives of the people.

Ocu'ba-wax, a vegetable wax obtained from the fruit of a nutmeg (*Myristica ocuba*), growing abundantly in the marshy grounds on the shores of the Amazon and its tributaries. It is easily bleached, and is used extensively in Brazil for the manufacture of candles.

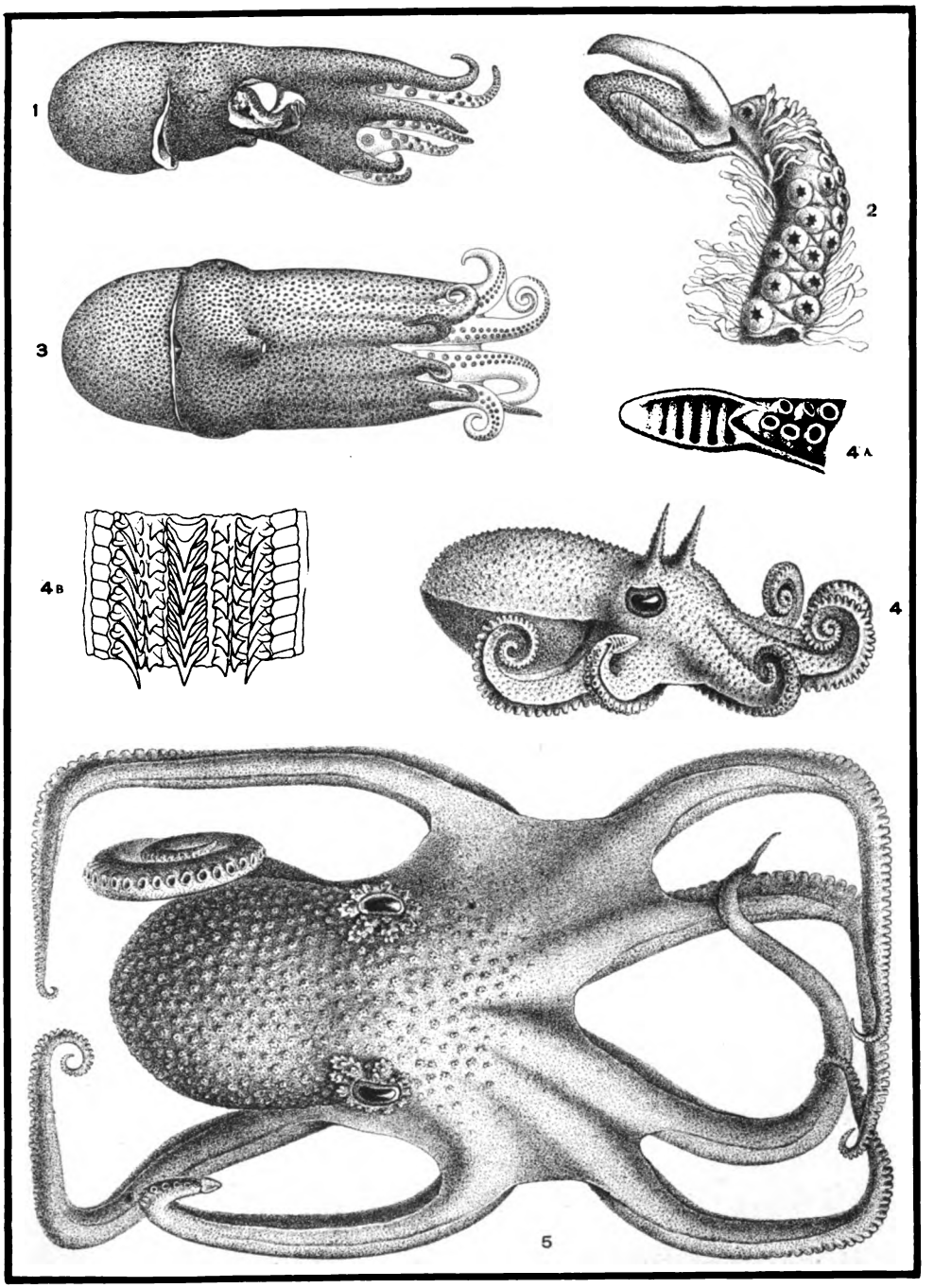
O'Curry, ō-kŭr'ĭ, **Eugene,** Irish scholar: b. Dunaha, County Clare, 1796; d. Dublin July 1862. He was son of a rather gifted farmer; though lame worked on the farm until 1834; was for three years employed on the Ordnance Survey; and after several years spent in copying Gaelic manuscripts and writing translations became in 1855 professor of Irish history and archæology in the Catholic University of Ireland, then just founded. His lectures, published in 1860 as 'Manuscript Materials of Irish History,' are accounted the best single work on mediæval Irish literature. A second series of his lectures, 'The Manners and Customs of the Ancient Irish People,' appeared in 1873. O'Curry prepared the catalogue of the Irish manuscripts in the British Museum.

Od or **O'dic Force,** a force associated with magnetism, and alleged to explain the phenomena of mesmerism or animal magnetism and many other natural phenomena, supposed by Baron Reichenbach to have been discovered by him, and which is treated of at great length in his works. Od, according to him, pervades all nature, and is akin to the great physical forces of electricity, magnetism, chemical affinity, heat, light, etc., and always accompanies them, so that wherever they are in action od is developed, and the strength of its most active development is often in proportion to the energy of their action. In living animals, in effervescing and fermenting liquids, in putrefying substances, in magnets, and in galvanic batteries, od is briskly generated. It radiates from the generators, and its rays pass through all kinds of matter, at a speed of about 100 feet per minute, slower than light and more rapid than heat. As in electricity and magnetism there is a polar dualism, so also there is in od; it has two poles, the positive and negative, which keep company respectively with the electric and magnetic positive and negative poles. These odic poles appear in all organic substances. The human body is od-positive on the left side and od-negative on the right.

O'dalisk, or **Odalisque,** the Turkish name for a concubine in the Sultan's harem, of whom the Sultan has personal knowledge.

Odd Fellow, a person belonging to a society in the polity of which is combined both the fraternal and benefit features of benevolent orders. The legal title is "The Independent Order of Odd Fellows," and the general administration of its laws is designated by the generic term Odd Fellowship. The origin of the society and the source of its peculiar name cannot now be historically traced. Until nearly the close of the 19th century it had been asserted for years that Defoe,—the English novelist,—mentioned 'Odd Fellows' as early as 1745 A.D., but modern research has relegated this, as well as many other alleged incidents of the order's early days, to the realm of tradition. It is known, however, that a society grew up in England during the 18th century, almost rivaling in numbers and influence the Masonic Fraternity, and that this Antient and Most Noble Order of Bucks, began to decline about the year 1773, and passed out of existence. A reasonable supposition attains among antiquaries that these lodges furnished the nucleus of the Odd Fellows, into one lodge of which George IV. of England, while Prince of Wales, was quite unceremoniously admitted one night, and became a member thereof at a date subsequent to 1780. This is the first authentic reference to the society of Odd Fellows by name. The earliest ritual extant is dated in 1797, and was used by the Patriotic Order. It appears from English

AMERICAN OCTOPODS.



1. Alloposus mollis, male. Side view, showing the sac containing the hectocotylized arm, cut open so as to expose the partly developed arm.
2. Hectocotylized arm, enlarged.
3. Same animal, ventral view.
4. The common Octopus (O. bairdi) of the North Atlantic coast (male).
4a. Terminal part of sexual arm.
4b. Section of the lingual ribbon, showing flinty teeth.

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contemporary history that an Improved Order existed prior to this, and the title, Most Noble Grand, for the presiding officer of the "Antient," as well as the subsequent Orders of Odd Fellows, would imply a common bond or succession. The Patriotic Order was followed by the Union, or United Orders, and the Loyal Order. In 1813 various lodges of the Union Order met and organized the Manchester Unity of Odd Fellows, now the principal Friendly society in Great Britain. In 1819 the American Order was founded, and was afterward affiliated with the Manchester Unity. This continued until 23 Sept. 1842, when the Odd Fellows of the United States resumed their original independence, reaffirming the resolution in 1843 and adopting a distinctively American ritual in 1845.

Rise of the American Order.— The first lodge established on this continent was Shakspere, No. 1, New York city, 26 Dec. 1806. The five Odd Fellows composing this lodge were of the Loyal Independent Order, and the moving spirits were Solomon Chambers, and his son John C., English mechanics from the south of London. The early members were zealous workers and other lodges were soon organized. In 1809 the roll of membership, in the six New York city lodges, comprised 36 prominent citizens and business men, as well as many others of less influence. In 1819 George Pope Morris was admitted, and at once became a leader in the councils of the Order in the Empire State. Attempts had then been made to plant Odd Fellowship in other parts of North America. In 1815 there were two lodges in Halifax, Nova Scotia: Royal Wellington, No. 1, and Loyal Bon Accorde, No. 2. Little is known of this pioneer effort in the British provinces, but the minutes of the Manchester Unity record a lodge chartered in Halifax about this date,— evidence presumptive of Unity origin. In Boston, during 1818, James B. Barnes,— who had emigrated to this country from England the previous year,— and four others instituted Massachusetts Lodge, No. 1, and held regular meetings, the method being, like New York, ancient usage and self-institution. The records extant, however, date only from 20 March 1820. Two Englishmen, a Jew, an Irishman, and a Frenchman comprised its charter membership. Washington Lodge, No. 1, of Baltimore, was organized 26 April 1819 under the leadership of Thomas Wildey, now recognized as the founder of American Odd Fellowship. Wildey came to the United States from England in 1818. He had been affiliated with one of the branches abroad since 1804— had "passed the chairs," and was known as a leading Odd Fellow. Whether he assisted in forming the Manchester Unity in 1813 is not of record, but his subsequent appeal to that body for *regularity* might indicate his knowledge thereof. The "Unity" became fully organized 21 Jan. 1814. Wildey began his search for Odd Fellows as early as 13 Feb. 1819, when he advertised in the Baltimore *American;* and, again, 27 March 1819, before the required "five for a quorum" had been obtained. The minutes state that the manner of institution was "ancient usage." This ceremony consisted of Wildey's obligation of himself in the presence of the others, and, in turn, the obligation of his companions. Subsequent events would indicate that the Manchester Unity ceremonies of 1816 were used by Wildey and his four associates: John Welch, John Duncan, John Cheatham, and Richard Rushworth. On 26 Dec. 1821 Pennsylvania Lodge, No. 1, Philadelphia, was formed, like those in New York, Boston, and Baltimore, on the self-institution principle, John Pearce being the leader, and his associates were, likewise, English mechanics. While the Order had been planted in four States, and the chief cities thereof according to ancient usage, an effort was soon made to frame constitutions, and to obtain charters from the so-called regular bodies of Odd Fellows in England. Meantime the pioneers exercised the functions of Grand Lodges,— instituting other lodges, and assuming sovereignty over them. The Order in Baltimore secured a charter, under date of 1 Feb. 1820, from the Duke of York Lodge, Preston; and this charter not only recognized the regularity of Washington, No. 1, and its associate lodges, but created the Grand Lodge of Maryland and of the United States of America, of the Independent Order of Odd Fellowship. In Brooklyn, Columbia Lodge, No. 1, obtained a charter from Loyal Beneficent Duke of Sussex Lodge of Independent Odd Fellows, Liverpool. This document was delayed in transmission, and did not reach its destination until late in January 1823, although dated 4 Nov. 1822. Meantime Columbia Lodge had removed to New York. It at once assumed sovereign jurisdiction, and this led to contention; and the attempt of Morris and others to establish a supreme government with headquarters in New York. At this juncture Pennsylvania applied to the Order in New York and Maryland for recognition. It is recorded that the evidence of regularity received from New York city was more satisfactory to the Odd Fellows of Philadelphia than that of Baltimore; and it is also stated the lodges in Boston, New York, and Baltimore were not aware of one another's existence before this event. The Order made history rapidly during the succeeding six months. Each locality was dominated by a master mind: Wildey, in Maryland; Morris, in New York; Barnes, in Massachusetts; Pearce, in Pennsylvania. The question of supremacy, however, was soon settled. Massachusetts readily surrendered its claims to priority, and accepted a charter from the Grand Lodge of Maryland and the United States, on 9 June 1823; and the Grand Lodge of that commonwealth was duly opened 11 June 1823,— all the lodges participating. Morris was overthrown as Grand Master, in New York, by the dissensions mentioned above, and was lost to Odd Fellowship. The Order in that State accepted a like charter, dated 4 June 1823, and the Grand Lodge was duly instituted 24 June 1823. It having become known that Wildey had endeavored to unite the Odd Fellows of Massachusetts and New York, overtures were also made to Pennsylvania, and these were immediately accepted. The charter is dated 13 June 1823, and the Grand Lodge of the Keystone State was organized 27 June 1823. The consolidated Order became at once homogeneous and prosperous. As a prelude to these momentous events, coincident with the *actual* foundation of the American Order, the managers in Maryland had organized, under the Duke of York Lodge charter, the Grand Lodge of Maryland, and of the United States, 22 Feb. 1821, which relegated Washington and others, in Maryland, to the condition of subordinate

lodges. Following the centralization of the government of the four pioneer commonwealths, the "Grand Lodge of the United States" was evolved, on 15 Jan. 1825, by the representatives of the Grand Lodges of Massachusetts, New York, Pennsylvania, and Maryland,— the last-named taking her place with the State Grand bodies, subordinate to the sovereign head. This theory of a government composed of one head,— the source and repository of all true Odd Fellowship,— with subordinate State bodies, and lodges subordinate, in contradistinction to the English system of a governing movable committee, was due to the genius of John Pawson Entwistle,— a scholarly gentleman,— who had joined the Order in 1820, becoming the *brains* of the young organization; while Wildey and his compeers, unlettered men, may be likened to the *body* of the vigorous institution. Entwistle was the first Deputy Grand Master, and was afterward Grand Secretary, but his career as a "builder" was cut short by his early decease. The last link in the chain of regularity was forged 15 May 1826, when the American body was chartered by the Manchester Unity. Significant of this, the early charters were issued to the Order of Independent Odd Fellows, and the branches originating in the United States were organized irrespective of the consent of the English body even prior to 1842–3, the date of official separation.

Government and Degrees.— Between 1826 and 1885 the government of the Order had been evolutionary in its nature. The inheritance from England in ritualistic matters was the merest outline of a possible utility. The degrees were crude in structure, and unsuited to the genius of a modern fraternal society, being copies from orders of other origin,— notably from Masonry. When the foundations of government had become settled, attention began to be paid to degrees of higher significance than the lodge system. Entwistle gave the first impulse to this part of the fabric of Odd Fellowship. After his death the work was continued by a long line of distinguished Odd Fellows, including such American citizens as James L. Ridgely, Grand Secretary from 1838 to 1881; James B. Nicholson, Isaac McKendree Veitch, Schuyler Colfax, who may be said to have been the "builders" of the Order; Rev. Edwin H. Chapin, D.D., Rev. James D. McCabe, D.D., Tal. P. Shaffner, who, together with Entwistle and Ridgely, were largely the authors of the present Americal ritual. Two English degrees and one American, finally, made up the encampment series. As early as 1821–5 these were conferred in connection with the lodge department. The final separation of the encampments into a distinct branch, higher than the lodge, and governed by Grand Encampments, did not occur until 1841. In 1851–2 the Rebekah degree was adopted, its author being Schuyler Colfax. This is a branch to which both sexes are admitted. The sequence of degrees was completed in 1885 by the adoption of the Patriarchs Militant, and organization of the uniform or display branch. The Grand bodies followed the sequences of the degrees. In 1879 the name of the supreme body was changed to the Sovereign Grand Lodge, a title more in consonance with its inherent powers, especially in its jurisdiction without the United States of America. The Sovereign Grand Lodge is made up of Grand Representatives from the Grand Lodges and Grand Encampments of the United States and Canada. Grand Lodges possess jurisdiction over State and Provincial Rebekah Assemblies, and Rebekah lodges, as well as in the government of subordinate lodges. The Patriarchs Militant, with the local unit, called Canton, is organized like the United States Army, with Department Councils,— all under the immediate government of the Sovereign Grand Lodge. In Australasia, Denmark, Germany, the Netherlands, Sweden, and Switzerland, Quasi-Independent Grand Lodges govern the Order. These hold an allegiance to the Sovereign Grand Lodge, use the American ritual modified, and a common bond exists in connection therewith; but they do not enjoy a representation in the sovereign head. They, however, govern the Order in the countries named, and conform to the laws and usages of the civil governments thereof. The development of this dual system was the labor of many years and varied experiments. The dates of the introduction of American Odd Fellowship without the United States were these: Canada, 1843; Australasia, 1868; Denmark, 1878; Germany, 1870; the Netherlands, 1877; Sweden, 1884; Switzerland, 1871. As early as 1846 lodges were instituted in the Hawaiian Islands; in Cuba, in 1883; in Mexico, in 1882; and the Order has followed the flag into the Orient, having been established,— including South America,— in 22 nationalities, provinces, and territories,— in 18 of which Grand Lodges have been chartered. In 1902, however, of the entire lodge membership of 1,068,732 only 37,333 were enrolled outside of North America.

Other Organizations of Odd Fellows.— The largest body is the Manchester Unity, numbering 950,000 members. It has lodges throughout Great Britain and its colonies,— a few in the United States,— and is, in effect, a chartered benefit society. Annual reports are made to the government, under the laws regulating Friendly societies, and actuaries determine the solvency or insolvency of the Order, and license lodges accordingly. In ritual matters, likewise, it has nothing in common with American Odd Fellowship. The Grand United Order ranks next in relative importance. This body is the parent of the colored lodges in the United States and elsewhere, and is of English origin. Other Friendly societies exist in Great Britain, and are of more or less importance as health insurance associations.

Beneficent Features.— The American Order has not incorporated into its polity any features of health or life insurance; indeed, it has, on the contrary, refused to recognize voluntary associations of Odd Fellows, the object of which was to enlarge the benefit systems of regular relief. Nevertheless, the Order has always insisted upon "stated weekly and funeral benefits," distinct from voluntary *charity*,— these payments to members who are ill, or in affliction, being of "right," not a donation. This characteristic is a distinguishing trait of the American Odd Fellow. On the great seal is emblazoned: "We command you to visit the sick, relieve the distressed, bury the dead, and educate the orphan." Correlatively the attention of the Order was early attracted to the founding of institutions of learning, several of which have survived. The dual motive of fra-

THOMAS WILDEY, FOUNDER OF THE ORDER.

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ternity and stated relief led to the establishment of homes for the aged, the indigent, the widow, and the orphan. Pennsylvania has 6 of these homes, New York has 4, Illinois 2, California 2, and several other States possess two, with more in prospect. Every Grand Lodge in the United States and Canada has one or more of these homes, or has taken measures to found such an institution. This beneficence has been fostered in foreign jurisdictions as well; and the Order in Denmark has purchased the palace of the Crown Prince for this purpose, going into the "home idea" on a scale that eclipses all previous efforts. Other nationalities are in no wise behind their fellows in this beneficence.

The Reunion of 1865.— During the Civil War of 1861–5 the roll of the Southern jurisdictions was regularly called during the annual sessions of the Sovereign Grand Lodge. At the close of hostilities, the officers and members in the South were welcomed to the chairs and seats which had been held for them during the four years of strife and separation. The roll-call at Baltimore, 18 Sept. 1865, by the venerable Grand Secretary Ridgely, was notable even in fraternal circles. Every survivor answered to his name, and appointments had been made to fill vacancies so that the representation was complete. Attempts had been made throughout the States composing the Southern Confederacy,— with varying success,— to keep up the organizations of the Order; but, at this reunion, measures were unanimously adopted whereby fraternal hands and hearts assisted in rebuilding the waste places. This was the first fraternization of the Blue and the Gray. The procession in the streets of Baltimore the next day,— occupying more than one hour in passing any given point,— attracted national attention. The marshals were: Joseph Kidder of New Hampshire, and John Q. A. Herring of Maryland.

Statistics.— In 1903 the relative strength of the Order was reported as follows:

Sovereign Grand lodge	1
Quasi-Independent Grand lodges	6
Grand lodges	67
Grand encampments	55
Subordinate lodges	13,277
Subordinate encampments	2,862
Rebekah Lodges	6,027
Persons enrolled	1,329,956
Annual relief	$ 4,068,510.96
Relief from 1830	96,468,525.32
Invested funds	34,386,495.74

Bibliography.— 'Ars Quatuor Coronatorum,' London; publications of Early English Text Society; 'History of Signboards,' London; Ridgely and Spry, histories of Odd Fellowship; 'Official History of Odd Fellowship, the Three-Link Fraternity' (Boston); Rituals of 1797, 1816, 1845, and 1880; Proceedings, G. L. U. S. and S. G. L. (Vols. I. to XX.).

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Ode, a lyric poem, supposed to express the feelings of the poet in the pressure of high excitement, and taking an irregular form from the emotional fervency which seeks spontaneous rhythm for its varied utterance. The Greeks called every lyrical poem adapted to singing — and hence opposed to the elegiac poem — an ode (*ōdē*, that is, song). The principal ancient writers who employed this form of verse were Pindar, Anacreon, Sappho, Alcæus, among the Greeks, and Horace among the Romans. As employed by English writers the ode takes either the Pindaric form of strophe, antistrophe, and epode irregularly arranged and contrasted; or, as in its later development, the form of a regular series of regular stanzas. The former style is found in Dryden's 'Ode for Saint Cecilia's Day,' while the latter is seen in Shelley's 'Ode to a Skylark.' The masters of English poesy who have carried the ode to its highest achievements are Milton, Dryden, Collins, Gray, Coleridge, Wordsworth, Keats, and Shelley.

Odell, ō-dĕl', **Benjamin B., Jr.,** American political leader: b. Newburgh, N. Y., 14 Jan. 1854. He was educated at Bethany College, W. Va., and at Columbia, leaving the latter after three years to enter the ice business with his father in Newburgh. He proved successful in business, acquired an interest in his father's establishment, and also became president of the Consolidated Gas, Electric Light, Heat and Power Company of Newburgh and treasurer of the Central Hudson Steamboat Company. He early took an interest in politics and soon became a prominent local leader of the Republican party; in 1880 he was a candidate for State senator, but was defeated. In 1894 he was elected to Congress from a district which had formerly been controlled by the Democrats; in 1896 he was re-elected, and declined the nomination in 1898; during his last term in Congress he was chairman of the committee on accounts and a member of the committee on the District of Columbia. Before his first election to Congress he had been chosen chairman of the executive committee of the Republican State Committee, and in 1898 was made chairman of the State Committee; the election of Roosevelt as governor was in large measure due to the energy and skill with which he conducted the campaign. In 1900 he was unanimously nominated for governor by the Republican party, conducted his own campaign, and was elected by a plurality of over 111,000. At the time of his election he was but little known to the people at large, but from the first of his administration gained a reputation which has become national, through his policy of the reduction of direct taxes and strict business-like administration of public funds, as well as for his growing power as leader in his own party. Under his leadership laws were passed which increased indirect taxes and reduced the direct tax to .13 of a mill, and at the same time appropriations for roads and schools were increased; the administration of State insane asylums was also simplified by abolishing the board of managers and centralizing control under the Commission on Lunacy. In 1902 Governor Odell was unanimously renominated and was re-elected. In the first year of his second administration a referendum vote of the people authorized enlargement of the Erie Canal which he had consistently urged. He has opposed special legislation and has vetoed a large number of special and personal bills, has favored home rule for cities, and given valuable aid to tenement house reform. In 1903 Columbia University conferred upon him the honorary degree of LL.D. in recognition of his public services.

Odell, Jonathan, American clergyman and Tory satirist: b. Newark 26 Sept. 1737; d. Fredericton, N. B., 25 Nov. 1818. A grandson of Jonathan Dickinson (q.v.), he was educated

at what is now Princeton University, studied medicine, was surgeon in the British army, and, after several years spent in England, where he was ordained a deacon of the Church of England and in 1767 became a priest, was made rector of Saint Ann's, Burlington, N. J. He assured the colonial authorities that he would keep his loyalist sentiments to himself in the exciting times before the Revolution, but on 4 June 1776 wrote his famous birthday ode for the King, which may have suggested in part the phraseology of 'Hail, Columbia,' as it begins 'O'er Britannia's happy land.' The New Jersey Convention holding him an enemy to the American cause, exacted from him a parole to keep on the east side of the Delaware and within eight miles of Burlington. He was driven from home by the patriot forces, took refuge in the home of Margaret Morris, who hid him in a secret chamber, and escaped to New York, where he took a prominent part among the Loyalists, notably by his acrid and venomous satiric attacks on Congress and its individual members, as in 'The Word of Congress' (1779), 'The Congratulation,' 'The Feu de Joie,' and 'The American Times' (1780). Upon the evacuation of New York he lived in England for a time and then removed to New Brunswick, where he, his son, and his grandson after him held high office and took much interest in politics. Consult the chapter on Odell in Tyler, 'Literary History of the American Revolution.'

Ödenburg, ė'dĕn-boorg (Hungarian *Sopron*), Hungary, the capital of a county of the same name, near the southwest shore of the Neusiedler See, 36 miles southeast of Vienna. It dates from the Roman *Scarabantia* and has several interesting ecclesiastical and other edifices. Its industries comprise woolen, linen, and cotton cloth, sugar refining, cutlery, glass, and earthenware; and it has a trade in these, and in corn, cattle, wool, wine, etc. Pop. (1900) 33,478.

Odenheimer, ō'dĕn-hī-mėr, **William Henry,** American Protestant Episcopal bishop: b. Philadelphia 11 Aug. 1817; d. Burlington, N. J., 14 Aug. 1879. He was graduated from the University of Pennsylvania in 1835 and after taking orders in the Episcopal Church in 1841 was rector of St. Peter's Church, Philadelphia, till 1859. In the year last named he was consecrated third bishop of New Jersey. On the division of the diocese in 1874 he chose the diocese of northern New Jersey (now Newark). He was prominent as a hymnologist, and among his published works are: 'Origin and Compilation of the Prayer Book'; 'The Devout Churchman's Companion'; 'Private Prayer Book.'

Odense, ō'dĕn-sĕ, Denmark, a seaport town, capital of the Island of Fünen, on the Odense Aa, near the fiord of same name. It is well built, and has an ancient and magnificent cathedral, in which several of the Danish kings are buried, a royal palace, an old state house, and a richly endowed hospital. The principal manufactures are cloth and iron castings; and the trade, much facilitated by water communication, is considerable. Pop. (1901) 40,138.

Odenwald, ō'dĕn-vält, Germany, a forest and chain of mountains between the Neckar and the Main, in the territories of Hesse-Darmstadt, Baden, and Bavaria. The Neckar divides the Odenwald from the Black Forest. The Odenwald is about 50 miles in length, contains 1,740 square miles, and in Katzenbuckel attains a maximum altitude of 2,057 feet. It presents charming scenery and in literature is associated with much interesting tradition.

Ode'on, among the Greeks and Romans, the name applied to a public building devoted to poetical and musical contests. The first odeon was built at Athens by Pericles, and was afterward used for popular meetings and the holding of courts. At a later period two others were erected in Athens, beside those in other Greek cities. The first odeon at Rome was built in the time of the emperors. The odeons resembled the theatres, except that they were inferior in extent and were covered with a roof. The name is occasionally given in the United States to a music hall or theatre, as is also orpheum.

Oder, ō'dĕr, a river of Germany, which rises in Moravia, in the southern branch of the Sudetic Mountains, flows through Silesia, becomes navigable for small boats at Ratibor, passes by Breslau, where it is navigable for barges of 40 to 50 tons, enters Brandenburg and Pomerania, and empties into the Baltic. Its whole course is above 500 miles; it receives numerous navigable streams, communicates with the Elbe by several canals, and is of great commercial importance. The principal towns on its banks are Breslau, Frankfort, and Stettin. Before reaching the sea it forms the large maritime lake called the Stettin Haff, and divides into three branches — the Peene, Swine, and Divenow.

Odessa, ō-dĕs'ą, Russia, a town and seaport in the government of Kherson, on the Black Sea, between the mouths of the Dniester and Dnieper, about 950 miles south of Saint Petersburg, ranking as the fourth city of the empire. It is built principally of stone, and is thoroughly modern in appearance. Among the promenades and squares of the city are: the Nikolai Boulevard, beside the harbor, with a bronze statue of the Duc de Richelieu; the Cathedral Square, with the monument of Prince Voronzoff; the Catharine Square, with a monument of the Empress Catharine II.; the Alexander Park, with a pillar in honor of the Emperor Alexander II. Among the Greek churches are the Cathedral or Sobornaja church, built in 1794–1848. The other buildings and institutions of the city comprise: the town-hall; the Voronzoff palace; the archiepiscopal palace; the public library; the chief passenger railway station; the university; the large and splendid town theatre; the post-office; the custom-house; the institution for noble ladies; the barracks, etc. The university, founded in 1864 as a development of the Richelieu gymnasium, has a large library, museums, an observatory, etc. There are numerous other educational institutions of different kinds and grades, including several technical schools. There are also hospitals, an orphanage, a foundling institution, and a bacteriological institute. Tramways and omnibuses facilitate internal communication; the town is well supplied with water from the Dniester, and is electrically lighted. The harbor, which is protected on the southeast by a long mole with a lighthouse at the end, and by a breakwater, consists of several sections separated by shorter moles, and has a floating

dock. The port is usually icebound for a few days in winter, but an ice-breaker is now in use to keep it open. Strong batteries protect the harbor basins from seaward attacks. Odessa is the chief grain exporting seaport of Russia. Other articles of export are sugar, timber, flour, oil-seeds and oil-cake, beans, peas, and fish. The principal imports are coal, tea, fruits, agricultural implements and machinery, iron and steel, and raw cotton. The chief industrial establishments are the sugar refineries, flour-mills, oil-mills, engineering works, tanneries, tobacco factories, soap works, jute works, breweries, etc. Odessa, named after Odessus, an ancient Greek settlement on this site, dates practically from the Turkish castle of Khadji-Bey, built in the 15th century and captured by the Russians in 1789. Odessa was bombarded during the Crimean war. Pop. (1897) 405,041.

Ode'um. See ODEON.

Od'gers, William Blake, English barrister: b. Plymouth, Devonshire, 15 May 1849. He was the son of a Unitarian minister, W. J. Odgers, and was educated at Cambridge University. He became a barrister of the Inner Temple in 1873, was recorder of Winchester 1897–1900, and of Plymouth from the last-named date. He has published 'King Arthur and the Arthurian Romances' (1872); and such well-known legal works as 'Odgers on Libel and Slander' (1881); 'Odgers on Pleading Practice and Procedure' (1891); 'Outlines of the Law of Libel' (1897); 'Odgers on Local Government' (1899).

O'din, Teutonic god, called WODAN by the Saxons and Wuotan by the High German. He held a high place among the "ases" or secondary gods of the Scandinavian mythology at first, and later came to be held the centre of the system, the ruler of the world, the patron and source of all sciences, inventor of runic writing, of poetry, and of magic (hence identified with Mercury Hermes by the Roman writers on Germanic customs and religions), and, Minerva-like, a protector and companion of all brave heroes. Probably in origin he was a storm-god; his name seems to mean "the mad, or raging one" (see WYOTAN and modern German *wüten*); and in this aspect he is portrayed as riding the eight-footed horse Sleipnir. As a wind-god his functions were various: he presided over the harvest and over the sailing of ships, and was god of battles and of the dead. In battle he was accompanied by the Valkyries, who brought to Odin's banqueting hall, Valhalla, the slain heroes. Sometimes, Apollo-like, he is the sun-god, the sun is his eye, the heaven his canopy, and the mountain of Hlidskjalk his throne, at the sides of which are his raven messengers, Hugin ("Thought" or "Reflection") and Munim ("Memory"), who bring him news of all that happens in the world, and the two wolves, Gere and Freke. Odin's wives were three: Iord (the inhabited earth), Frigg (the cultivated earth), and Ring (the winter-locked earth). Snorre Sturleson and Saxo Grammaticus make Odin a chief, who in alliance with Mithridates fought the Romans unsuccessfully. To the Roman identification of Odin with Mercury is due the use of his name for the fourth day of the week (French "Mercredi," German "Dienstag," English "Wednesday," that is, Odin's or Wodan's day).

Odoacer, ō-dō-ā'sėr, king of Italy: d. 5 March 493. The son of Edecon or Ædicon, who may be identical with one of Attila's lieutenants, and a Scyrian or Rugian by birth, he became a leader of a band of Rugians, Herulians, Scyrians, and Turrilingians, entered the Roman army about 470, and in 476 was a member of the imperial bodyguard. When Orestes deposed Nepos and made his own son, Romulus Augustulus, emperor, Odoacer headed the rising of the dissatisfied German soldiers, killed Orestes, forced Romulus to retire, received the title of *patricius* from the Eastern emperor Zeno, but no recognition as king of Italy, yet in spite of this played the part of king ably for a time. He conquered Dalmatia in 482 and defeated the Rugians in 487 and 488. But in 489 Theodoric, king of the Ostrogoths, was sent against him by Zeno, and after repeated defeats forced him to surrender, promising him a share in the rule of Italy. The defeated king was assassinated at a banquet a week after his surrender. Consult Hodgkin, 'Italy and her Invaders,' Vol. III. (1885).

Odom'eter, a small clock-like mechanism employed for registering the number of revolutions of a carriage, automobile, bicycle, or other wheel, to which it is attached. The workings of the odometer are very simple: Two wheels of the same diameter, and turning freely on the same axis, are placed face to face; the edge of one is cut into 100 teeth, and that of the other into 99 teeth, and an endless screw works into the notches in each wheel. When the screw has turned 100 times around, the wheel having 99 teeth will have gained one notch on the other, which gain is shown by an index attached to one wheel, which passes over a graduated arc on the other. Every 100 turns are thus registered on the second wheel, and all turns less than 100 are shown by a separate index. Now, instead of the screw turning on its axis, it is found more convenient to have the screw fast, and to allow the weight of the machine to be suspended freely, so that as the carriage wheel turns, the effect is the same as turning the screw on its axis.

Odona'ta. See DRAGON FLY.

O'Donnell, ō-don'ĕl, **Leopold,** DUKE OF TETUAN, Spanish marshal: b. Santa Cruz, Teneriffe, Spain, 12 Jan. 1809; d. Bayonne, France, 5 Nov. 1867. He entered the Spanish army and supported Maria Christina, the queen-mother, in her struggles against the Carlists, and by intrigue he secured the appointment of governor-general of Cuba in 1843. In 1854 he was war minister under Espartero and in 1856 and 1858 was prime-minister. He was recalled in 1863 and again in 1865–6, but never held the confidence of the country.

O'Donoghue, ō-dŏn'ō-hū, **David J.,** British biographer and editor: b. London, England, 22 July 1866. He was educated in Roman Catholic schools and entered journalism in which field he has written principally on Irish art, music, and literature for leading Dublin newspapers. He founded the Irish Literary Society in London and is vice-president of the National Literary Society in Dublin. He has published: 'The Poets of Ireland' (1891–3); 'Traits and Stories of the Irish Peasantry' (4 vols. 1896–7);

'Life of William Carleton' (2 vols. 1898); 'Life of Robert Emmet' (1902); etc.

O'Donoju, Juan, hoo-ān' ō-dōn-ō-hoo', Spanish soldier: b. Spain about 1755; d. Mexico 8 Oct. 1821. He entered the Spanish army where he attained the rank of lieutenant-general and was in 1821 appointed captain-general and acting viceroy of New Spain. Upon his arrival at Vera Cruz he found the country in the hands of the revolutionists and his authority only nominal. He accordingly resolved to treat with the insurgents and on 23 Aug. 1821 he signed with Iturbide at Córdoba a treaty which recognized Mexico as an independent state over which a Bourbon prince was to reign. The country remained in the hands of the revolutionists and O'Donoju died before the nullification of his treaty by the Spanish Cortes.

O'Donovan, ō-dŏn'ō-vạn, **John,** Irish scholar: b. Attateemore, County Kilkenny, Ireland, 9 July 1809; d. Dublin 9 Dec. 1861. He was educated in Dublin, entered the Irish Record office in 1826 and was appointed in 1829 to the historical department of the Irish survey. He was connected with the Irish Archæological Society from its foundation in 1840, in 1847 was called to the Irish bar, and from 1852 was in the employment of the commission for the publication of the ancient laws of Ireland. Of the many editions of Irish works issued by him, the greatest is that of 'The Annals of the Four Masters' (1848–51). He also wrote an authoritative 'Grammar of the Irish Language' (1845).

O'Donovan, William Rudolf, American sculptor: b. Preston County, Va., 28 March 1844. He served in the Confederate army in the Civil War and at its close opened a studio in New York. His work, though his art is self-taught, soon gained a reputation and in 1878 he became an associate of the National Academy. He executed the statue of Paulding at Tarrytown, the statues of Washington for Caracas, Venezuela, Newburgh, N. Y., and for the Trenton battle monument. The equestrian statues of Lincoln and Grant for the Soldiers and Sailors' arch in Prospect Park, Brooklyn, are his work, likewise also the memorial tablet to Bayard Taylor at Cornell University, etc.

Odontoglos'sum, an extensive genus of orchids, natives of Central America, much prized by cultivators for their magnificent flowers, which are remarkable both for their size and the beauty of their colors. A considerable number of species have been introduced into Europe, and grow well in a moderate temperature. *O. crispum* or *O. Alexandræ* is a superb flower, and was named after Queen Alexandra when Princess of Wales. See ORCHID.

Odontor'nithes, a sub-class of birds, extinct and known only from remains in the Cretaceous rocks, which had the jaws furnished with true teeth and the wings well developed in some, in others rudimentary. It contains two orders, *Odontolcæ,* comprising the *Ichthyornis* (q.v.) and its allies, whose teeth were set in continuous grooves; and *Odontotormæ,* such as *Hesperornis* (q.v.) and its allies, in which each tooth was set in a separate socket. Consult: Marsh, 'Odontornithes' (1880); Evans, 'Birds' (1900).

Odysseus, ō-dĭs'ŭs. See ULYSSES.

Odyssey, ŏd'ĭ-sĭ, The, an epic poem attributed to Homer, in which the adventures of Odysseus (Ulysses) are celebrated. See HOMER.

Œcolampadius, ĕk"ō-lăm-pā'dĭ-ŭs ("Light-of-the-House"). Græcized name of Johannes Hüssgen, German religious reformer: b. Weinsberg, Würtemberg, 1482; d. Basel 24 Nov. 1531. He began by studying law in Bologna, and after a further course in philosophy, history, and the classical tongues in Heidelberg, Tübingen, and Stuttgart, he returned to Weinsberg. He was appointed preacher at Basel in 1515 and assisted Erasmus in producing his edition of the New Testament. After two years' residence at Augsburg (1518–20) he entered the monastery of Saint Bridget at Altenmünster, near Augsburg. Coming upon Luther's writings he left the monastery, and joining the reform movement, eventually went to Basel (1522) where he was appointed professor of theology and occasional preacher in Saint Martin's Church. He vigorously pushed forward the Reformation by his disputations, addresses, and writings; especially by his controversial activity at Baden in 1526, and at Bern in 1828; he did the same service at Basel, where as rector of the Cathedral he occupied the leading ecclesiastical position. He was in 1531 called to Ulm and worked there with Bucer and Blarer in the cause of ecclesiastical reformation. He entered upon a stubborn controversy with Luther on the subject of the Lord's Supper, and espoused the view of Zwingli in his 'De Genuina Verborum Domini, Hoc est Corpus Meum, Interpretatione.' In 1529 he held a public disputation with Luther on the same subject at Marburg. He was one of the kindest-hearted and most liberal-minded of the reformers. Weak in health from his early days he overtasked his strength, and by his premature death, was in some degree a martyr to his own zealous activity. He was buried in the cloister of the Cathedral at Basel. Consult: Herzog, 'Leben von Johannes Hüssgen' (1843); Hagenbach, 'Leben von Johannes Hüssgen, mit ausgewählten Schriften' (1859).

Œcumenical, ĕk-ū-mĕn'ĭ-kal (Greek, *oikoumenikos,* of, or pertaining to, the whole inhabited or civilized world, generally the Mediterranean basin, universal). This epithet is generally applied to the general councils of the church, or councils to which all the bishops throughout the world were invited. According to the theologians of the English Church there have been only six œcumenical councils; namely, that of Nicæa, 325 A.D.; Constantinople, 381 A.D.; Ephesus, 431 A.D.; Chalcedon, 451 A.D.; Second of Constantinople, 553 A.D.; and Third of Constantinople, 680 A.D. In the Roman Catholic Church it is applied to those councils whose members are convoked from the whole world under the presidency of the pope or his legates, and whose decrees, confirmed by the pope, bind all Christians. In the case of the first œcumenical council, that of Nicæa or Nice, the Emperor Constantine summoned the bishops and Hosius presided as Pope Sylvester's legate. Toward the end of the 6th century the patriarchs of Constantinople assumed the title "Œcumenical" in the same sense as the epithet Catholic in the Western Church, but the Roman See always refused to sanction it. See COUNCIL, and NICÆA, COUNCIL OF.

Œde'ma. See DROPSY.

Œdenburg, ē'dĕn-boorg, Hungary. See ÖDENBURG.

Œdipus, ĕd'ĭ-pŭs, the principal character in three tragedies of the Greek dramatist Sophocles. He was the son of Laius, king of Thebes, and his wife Jocasta. As Laius had been warned before the child's birth that he was to die by the hands of his son, he ordered the infant to be exposed on Mount Cithæron, his feet having first been attached together by a transfixing pin. The effect of this cruelty was that he was afterward known as "the man with swollen feet" (Œdipus). The herdsman to whom the task of exposing the child was committed compassionately gave him to the shepherd of Polybus, king of Corinth, who was childless, and Œdipus became that monarch's adopted son. The young man, who considered himself a prince of the Corinthian royal house was once taunted with his origin by a drunken companion; his suspicions were roused, and he fled from Corinth. The oracle at Delphi in answer to his inquiries as to his birth would only tell him that he was fated to slay his father and marry his mother. Leaving the oracle he pursued his journey and met Laius and his servants. The king of Thebes in his chariot tried to force Œdipus from the road and was slain by the young man, who slew all the attendants also, as he supposed. In course of time he reached Thebes, where Creon, brother of Laius, had succeeded to the throne, and was offering the hand of the widowed Jocasta as well as the kingdom to the man who should release the city from the sphynx, a monster which devoured every one failing to find an answer to her as yet insoluble riddle. Œdipus answered the riddle and slew the sphynx. He had many years of prosperity as King of Thebes and husband of Jocasta, but eventually a pestilence visited the land which, according to the Delphic oracle, could only be checked by expelling from the country the assassin of Laius. When at last it was brought home to Œdipus that he was the man he put out his eyes and Jocasta hanged herself. Then Œdipus went forth a wanderer led by the hand of his daughter Antigone, the Cordelia of the Greek stage, until he reached Athens, entered the grove of the Eumenides and there was called without death or pain, into the other world.

Œdipus Coloneus, kō-lō-nē'ŭs, "Œdipus at Colonus," Greek tragedy by Sophocles, first presented at Athens after his death by his son Sophocles in 401. (See ŒDIPUS.) The play has pathos and beauty, but little dramatic power. Legend says that Sophocles by reading aloud the finest passages in it proved his sanity when brought before judges by his children, who were eager to administer his property.

Œdipus Tyrannus, tĭ-răn'ŭs, "Œdipus the King," a tragedy by Sophocles (q.v.), played first at Athens about 415 B.C. (See ŒDIPUS.) The same theme was treated in Latin by Seneca, in English by Dryden, and in French by Corneille, Voltaire, Chénier, and Lacroix.

Oehlenschläger, ē'lĕn-shlā-gĕr, or **Oehlensläger, Adam Gottlob,** Danish poet: b. Vesterbro, near Copenhagen, 14 Nov. 1779; d. Copenhagen 20 Jan. 1850. He was son of the organist of the Danish royal palace at Fredericksburg; began to write poetry at 9; attracted the attention of Storm, who assisted in the boy's education; made unsuccessful ventures in commercial life and as a comic actor; and under the patronage of the Oersted brothers (qq.v.) again devoted himself to study and to literature. Strongly imbued with the spirit of the Old Norse sagas and with modern German romanticism, his first published poems, 'Digte' (1803); 'Tors Reise til Jotunhejm'; 'Vaulundurs Saga,' and 'Aladdin, eller den forunderlige Lampe,' gained him a national reputation at 26 and won from the government a pension for foreign travel. In Halle, where he lived with Steffens, he wrote the great historical tragedy, 'Hakon Jarl'; and upon his return to Denmark was elected professor of æsthetics in the University of Copenhagen (1810). His best work was done by 1830, the later volumes being far below the average. Oehlenschläger is the great national poet of Denmark, a leader of the romantic movement, who did much for renewed interest in early Teutonic and Norse literature and legend and who was spiritually akin with the English romanticists of the first half of the 19th century. Oehlenschläger's 'Aladdin' is accessible to the English reader in the excellent version by Sir Theodore Martin (1863). His other important works include: 'Correggio,' a tragedy written in German (1809)—it is to be noted that Oehlenschläger himself translated all his works into German—a Norse romantic cycle 'Helge' (1814); another Oriental theme, 'Ali og Gulhyndi'; the tragedy 'Stärkodder' (1812); the poetic cycle 'Frederiksberg' (1817); the tremendous epic 'Nordens Guder' (1819), to which 'Hakon,' 'Baldur,' and 'Tors Reise' paved the way; 'Erik og Abel,' a tragedy (1820); and 'Dina' (1842), almost the only one of his late works with a gleam of the old fire. Consult his autobiography (1850–1), and the 'Life' by Arentzen (1897).

Oehler, ē'lĕr, **Gustav Friedrich,** German theologian: b. Ebingen, Würtemberg, 10 June 1812; d. Tübingen 19 Feb. 1872. He studied at Berlin and Tübingen, subsequently taught at Basel and Tübingen, in 1840 became professor in the theological seminary in Schönthal, and in 1845 was appointed professor of theology at Breslau. In 1852 he became head of the theological seminary at Tübingen. He was one of the most prominent Old Testament scholars on the conservative side. Among his works are: 'Introduction to Old Testament Theology' (1845); 'Outlines of Old Testament Knowledge' (1854); 'Relation Between Old Testament Prophecy and Heathen Soothsaying' (1861); 'Old Testament Theology' (1873–4), English translation (1874–5); and 'Manual of Symbolism' (1876). Consult: Knapp, 'Ein Lebensbild von Oehler' (1876).

Oehme, ē'mĕ, **Ernst Erwin,** German painter: b. Dresden 18 Sept. 1831. He was the son and pupil of Ernst Friedrich Oehme, the landscape painter, attended the Dresden Academy of Art, and for a short time worked under Ludwig Richter; after which he made an artistic tour through Germany, Switzerland, England and France. He painted, in oils and water-colors, landscapes, architectural views, genre and portraits. The Court Theatre at Dresden was decorated by him; a series of tapestries was also painted by him in water-color, in imitation of Gobelin tapestry. His 'Stone Quarry in Saxony' (1860) is in the Dresden Gallery; and

he executed for Queen Carola of Saxony a collection of views of Compiègne. The most important of his remaining pictures include: 'Funeral in Spreewald'; 'Bear Hunt' (in water-colors); 'The Valley of Montafont.' His work is poetic in conception, but sometimes borders on the namby-pamby and the affected.

Oeil-de-Bœuf, a small round or oval window. Such a window in the palace of Versailles gave the name *Salle de l'Oeil de Bœuf* to the king's ante-chamber. Since the Renaissance the window has been used frequently with decorative intent as in friezes along the upper parts of buildings, and it is largely with such significance that the term is used in English.

Oeland, ē'länd, Sweden. See ÖLAND.

Oelwein, ōl'wīn, Iowa, city in Fayette County; on the Rock Island & P. and on four lines of the Chicago G. W. R. R.; about 65 miles in direct line west by north of Dubuque. It was settled in 1873 by August Oelwein; was incorporated January 1888, and chartered as a city March 1897. It is in an agricultural region but it has considerable manufacturing interests. The Chicago Great Western railroad shops have 700 employees, and the trainmen, and those employed in the yards and roundhouses number about 300. The foundry has 100 employees. The educational institutions are the public schools and the Oelwein Business College. There are nine churches. The three banks have a combined capital of $125,000. The government is vested in a mayor and a council of eight members, who are elected biennially. The city owns and operates the waterworks. Pop. (1890) 830; (1900) 5,142; (1903) 7,000.

FRED S. ROBINSON,
Editor 'Oelwein Register.'

Œnanthol, ē-năn'thōl, in chemistry, a product of the dry distillation of castor-oil preferably in a vacuum. The immediate product of the distillation is mixed by shaking with a solution of carbonate of potash and then heated, when œnanthol ($C_6H_{13}CHO$) separates as an oily colorless fluid with a strong aromatic odor, slight solubility in water, a boiling point of 154° C., and at ordinary temperature, say 17° C., a density of 0.827. By oxidation of œnanthol, or by direct oxidation of castor-oil, œnanthylic acid ($C_6H_{13}CO.HO$) is prepared; this is a fatty volatile acid now known to be a mixture of esters of capric and caprylic acids (see OCTOIC), but originally supposed to be the acid giving the aster flower its odor.

Œnanthyl'ic Acid. See ŒNANTHOL.

Œneus, ē'nūs, in Greek mythology, the king of Pleuron and Calydon in Ætolia. He was the husband of Althæa, and by order of Diana his country was ravaged by the Calydonian boar. He was dethroned and imprisoned by the sons of his brother Agrius, but was rescued by his grandson Diomedes who restored the kingdom to his son-in-law Andræmon. Œneus being then too old to rule. He was afterward killed by the sons of Agrius.

Œrsted, Anders Sandöe, Danish statesman, brother of Hans Christian Œrsted: b. Rudkjöbing 21 Dec. 1778; d. Copenhagen 1 May 1860. He studied philosophy and law at Copenhagen, was admitted to the bar in 1799, became a famous jurist, was appointed attorney-general in 1825, drew up the Constitution granted in 1831, was cabinet minister 1842–8, and from October 1853 to December 1854 was prime minister, his speedy resignation being forced by his unpopular conservatism, a distinct departure from his earlier politics. He was impeached with his entire cabinet, but all were acquitted. Œrsted wrote on Hegelian philosophy, on Danish and Norwegian law (1822–3), on Scandinavian politics (1857), and an interesting autobiography (1856).

Œrsted, Hans Christian, Danish physicist: b. Rudkjöbing 14 Aug. 1777; d. Copenhagen 9 March 1851. His father was an apothecary and the boy assisted him, studied at Copenhagen, where he became assistant in the medical faculty in 1800, traveled in Europe 1801–4 and again 1812–13, and in 1806 was appointed professor of physics at Copenhagen. In 1829 he became director of the new Polytechnic of the same city, and in 1850 a privy councillor. His greatest work was the result of experiments on the magnetic needle with the electric current, which established the intimate interrelation of electricity, galvanism, and magnetism, and which were described in his 'Experimenta circa Effectum Conflictus Electrici in Acum Magneticam' (1820). Œrsted also wrote a valuable 'Manual of Mechanical Physics' (1844) and various studies in chemistry, physics, metaphysics, æsthetics, and popular science, all pervaded with his predominating thought of the unity of the sciences and their position as the servants of religion. His style was clear, picturesque, and attractive, and his works have been popular both in the original and in German versions. Consult the biography by Hauch and Forchhammer (1853).

Oertel, ėr'tĕl, **Johannes Adams,** German-American Episcopal clergyman and artist: b. Fürth, Bavaria, 3 Nov. 1823. After studying art in Germany he practised engraving until 1848, in which year he set up as a painter in New York. He painted 'Rock of Ages,' which became vastly popular and was reproduced in millions of photographs and chromolithographs. He took holy orders in 1867, has had more than one pastoral charge and was appointed professor of Christian Art in the University of the South; he is also a successful wood carver, confining himself to ecclesiastical and religious subjects in both departments of his activity.

Œsel, ė'zel, a Russian island. See ÖSEL.

Oeser, ė'zĕr, **Adam Friedrich,** German artist: b. Pressburg, Saxony, 17 Feb. 1717; d. Leipsic 18 March 1799. He was trained for his profession under the influence of Raphael Donner 1730–9; he afterward was a pupil of Mengs and Dietrich at Dresden where he designed the decorations of the court theatre. Here he made the acquaintance of Winckelmann. In 1764 he was appointed director of the newly founded art school at Leipsic. Besides his professional activity as a teacher he did a great deal of decorative work, and won a reputation as a painter of ceilings. Among other things he executed a picture for the church of Saint Nicholas, and a number of minor decorative panels and drawings. As a sculptor he shows to advantage in the statue of Frederick Augustus the Just in Leipsic and of the Danish Queen Matilda in Celle (Aisne-et-Nord). His versatility is proved by his masterly etchings, 45 in num-

ber, some after the manner of Rembrandt, some in a highly original style of his own. He shared in Winckelmann's efforts after a reform in art through a study of the antique, but his own canvases give little evidence of Greek influence, and by his passion for allegorical compositions he is sometimes betrayed into the extravagances of the rococo school.

Œsophagotomy, ē-sŏf-a-gŏt'a-mĭ, a surgical operation for the relief of stricture of the œsophagus and the removal of foreign bodies lodged in it, when dilatation and other measures are of no avail. There are two forms of the operation, external and internal. External œsophagotomy consists in cutting into the œsophagus in front between the thyroid cartilarge and the sternum, and extracting the foreign body with forceps, or dividing the stricture with a knife. Internal œsophagotomy, is usually resorted to for the relief of stricture, especially when of cicatricial origin. The stricture is divided by a cutting instrument (the œsophagotome) passed through the mouth. After the operation bougies are used to prevent recontraction. When the œsophagotome cannot be used, or inanition is imminent, gastrotomy (q.v.), or opening the stomach so that food can be given, is resorted to.

Œsoph'agus. See DIGESTION.

Oesterley, ės'tĕr-lī, **Karl** (son of the following), German painter: b. Göttingen 23 Jan. 1839. After studying in the Hanover Polytechnic he went to Düsseldorf 1857 and began under Deger his essays as a religious painter. On a visit in Lübeck (where he copied Hans Memling's 'Passion of Christ,' 1865) he was attracted to landscape and architectural pieces, and was so successful in this domain that he thenceforth devoted himself to landscape. Since 1870 he has generally derived his *motif* from Norwegian scenery. His pictures are distinguished for their dazzling color, transparent atmosphere, distinctness in light and texture, and grandeur of conception. Among them are 'Midnight near Lofoden'; 'Mountain Gorge in Norway'; 'Romsdalsfiord'; 'Scene on the Coast of Northern Norway' 1879 (in the Museum at Breslau); 'Fishing on the Norwegian Coast'; etc.

Oesterley, Karl Wilhelm, German painter: b. Göttingen 20 June 1805; d. Hanover 28 March 1891. He was a pupil of Matthæus in Dresden, studied in Rome 1824–9, in 1831 was appointed professor of the history of art in the University of his native town and, in collaboration with Ottfried Müller, published 'Monuments of Art.' Meanwhile he was extending his artistic studies in Düsseldorf, Munich, and Paris. On the completion of his picture, 'Christ and Ahasuerus' (1844), he was appointed court painter of Hanover. The chief of his remaining works are 'Jephtha's Daughter' (1836); 'Christ Blessing Little Children' (1841); 'The Ascension' (in the chapel royal at Hanover), completed 1838; 'Scene from Bürger's «Lenore.»' He produced also altar-pieces and portraits and designed stained-glass windows.

Oetinger, ē'tĭng-ĕr, **Friedrich Christoph,** German theologian: b. Göppingen, Würtemberg, Germany, 1702; d. Murrhardt, Germany, 10 Feb. 1782. He was educated at the University of Tübingen and became reader of theology at the University of Halle. In 1738 he took charge of the parish of Hirschau and gained the leadership of the Pietists in that section. His translation of several of the works of Swedenborg brought upon him ecclesiastical censure, but he was protected by the Duke of Würtemberg and later was appointed superintendent of the churches in the district of Weinsberg. He subsequently held the same position in Herrenberg and afterward became prelate in Murrhardt. He wrote many theological treatises which have been edited by Ehmann (1858–63). Consult monographs by Auberlen (1848); Ehmann (1852); and Wächter (1885).

O'Far'rell, Michael Joseph, American Roman Catholic bishop: b. Limerick, Ireland, 2 Dec. 1832; d. Trenton, N. J., 2 April 1894. He was educated at the Seminary of St. Sulpice, Paris, and ordained to the priesthood in 1855. He went to Montreal where he was pastor of St. Patrick's and St. Bridget's churches and in 1869 accepted a call to New York as assistant in St. Peter's church. In 1881 became the first bishop of the then newly formed diocese of Trenton, N. J.

Of'fa, king of the Mercians: d. 796. He succeeded to the throne after Ethelbald, on defeating the usurper Beornred, 757 A.D. Kent and the East Saxons were brought under his rule, and the power of Wessex was crushed by a defeat in 779. He likewise defeated the Welsh, wrested from them part of their border lands, and to retain them within their new limits erected here the rampart known as Offa's Dyke (q.v.). With the consent of Pope Adrian I. he raised the see of Lichfield to the position of an archbishopric; and he had diplomatic intercourse with Charlemagne. Ethelbert, king of East Anglia, was murdered by his instigation and Offa then seized his kingdom. He founded the Abbey of St. Albans, and a grant by him to the See of Rome is supposed to have been the origin of Peter's Pence (q.v.).

Offa's Dyke, England, said to have been built by King Offa of Mercia in the 8th century, as a boundary between his dominions and those of Wales. It extends from the vicinity of Newmarket, in Flintshire, and traverses the counties of Flint, Denbigh, Salop, Radnor, Hereford, and Monmouth to Beachley, at the mouth of the Wye. Another dyke of a similar kind called Watts' Dyke, runs at distances of from ¼ mile to three miles apart from Offa's Dyke, in the same direction, through the counties of Flint and Denbigh. These dykes are supposed to mark the neutral ground on which the Welsh and Britons were at liberty to meet for transacting business.

Offenbach, Jacques, zhăk ŏf-ĕn-băk, French Hebrew composer: b. Cologne 21 June 1819; d. 5 Oct. 1880. He entered the Paris Conservatoire in 1833, became proficient on the violoncello, and for some time played this instrument in the orchestra of the Opera Comique. Later he was conductor of the orchestra at the Theatre Français, and in 1855 opened the Bouffes Parisiens, where he enjoyed immense popularity. There were presented many of his most popular works, 'Orphee aux Enfers' (1858); 'Geneviève de Brabant' (1860); 'La Belle Hélène' (1865); 'La Barbe Bleue' (1866); 'La Grande Duchesse' (1867); 'La

Princesse de Trebizonde' (1870); 'Madame Favart' (1878). From 1866 he devoted himself entirely to composition. His last opera, and the one that he considered his best, was 'Les Contes d'Hoffman' (1881), successfully produced at the Opéra Comique after his death. Offenbach was a clever musician, but wrote for the passing hour, and probably did not do himself full justice. He was the originator of the opera-bouffe, and was imitated by many who never attained his melody or comic force. Consult Martinet, 'Offenbach, sa Vie, et son Œuvre' (1892).

Offenbach, ŏf'fĕn-bäH, Germany, a town in the Grand-duchy of Hesse, five miles southeast of Frankfort, on the left bank of the Main. It is well and regularly built, and has an old castle, formerly the residence of the princes of Isenburg, the modern palace of the prince of Isenburg-Birstein, a town-house, several churches, a synagogue, and theatre. Offenbach is the most active manufacturing town in the state. Its industries include fancy leather goods, such as pocket-books, portfolios, and traveling bags; and there are manufactures of aniline, celluloid, perfumery, stearin, vaseline, lacquer, and other chemical products, sewing and other machines, and machine tools; paper of various kinds, boots and shoes, type-founding, printing. Pop. (1900) 50,468.

Offerings and Sacrifices, gifts offered to the Deity. Sacrifice differs from almsgiving as a religious service, or from contributions made merely for the purpose of supporting a system of external religion, in being offerings made directly from the worshipper to the Supreme Being. They may, however, under proper authority, be applied to charitable or religious uses; to the maintenance of the priesthood, or to the celebration of solemn feasts in which the worshipper and his friends, together it may be with the priests, and under the presiding presence of the Deity may partake.

The origin of sacrifice is a point much disputed; the two opposed views being that of a primeval appointment by the Deity, and that of a spontaneous origination in the instinctive desire of man to draw near to God. The universality of sacrifice has been urged in favor of the hypothesis of a primitive institution by Divine command, but the more legitimate inference from this circumstance appears to be in favor of the opposite view. Of the symbolic character of sacrifice there are various kinds or degrees, all having in common the acknowledgment of dependence on the one hand and of protective power on the other. These may be represented under three heads—(1) propitiatory, or designed to conciliate generally the favor of the Deity; (2) eucharistic, or symbolical of gratitude for favors received; (3) expiatory, or offered in atonement for particular offenses. To a different class may be assigned deprecatory sacrifices designed to avert the arbitrary wrath or appease the wicked disposition of deities.

Among the customs of various peoples in regard to sacrifice, those of the Jews stand out as preeminently worthy of attention, first because of their very express and explicit claims to a divine origin; secondly, because of their singular and remarkable character; and lastly, because of their connection with the Christian religion. The origin of the Jewish sacrifices is traced to the earliest times. We are told in the book of Genesis (ch. iv.), that "in process of time" Cain and Abel brought each an offering to the Lord, and the different characters and results of these offerings are recorded. After the flood Noah offered a sacrifice "of every clean beast and of every clean fowl," an apparent intimation that the distinction between clean and unclean animals had already been made, and consequently of a prior divine appointment of sacrifice. Abraham, Isaac, and Jacob offered sacrifices in which appeared a circumstance peculiar to the Jewish economy, that of a covenant between the offerer and the Divine being, of which the sacrifice was accepted as a sign. When Moses demanded the manumission of the Israelites from their bondage in Egypt, the plea which he presented to Pharaoh was that they might go three days' journey into the wilderness to sacrifice to the Lord. It was when the deliverance had actually taken place, and during their sojourn in the wilderness, that the Jewish ceremonial law with its elaborate ritual of sacrifice was given (accepting the ordinary traditional view regarding the so-called Mosaic legislation). Into the details of this ritual, with its surrounding observances, so amply detailed in the book of Leviticus, we cannot enter. The burning upon the altar of animals offered in sacrifice is among the commonest of the forms of sacrificial rites both among the Jews and Gentiles. The Jewish sacrifices consisted mainly of burnt-offerings (of clean animals) daily, with double offerings on sabbaths, and special offerings at festivals, unlimited in extent, and which, being partaken of by the people, were called peace-offerings. Such sacrifices, called hecatombs, were also common among the Greeks and Romans. Meat-offerings (of flour, oil, and wine) accompanied the burnt-offerings. Sin-offerings (various) at special feasts and at each new moon were general expiatory offerings, besides which trespass-offerings were made privately on certain specified occasions, as well as in expiation of particular offenses. The most remarkable sin-offering was the well known one of the two goats on the great day of atonement. Incense was offered every morning and evening. Offerings were made separately, first for the priests and afterward for the whole people. What is most remarkable about the Jewish sacrifices was their restriction to one particular place, the tabernacle, and later the temple (but see Ex. xx. 24). Offerings on high-places were forbidden, and are always noticed with reprobation as the indication of a rebellious spirit. The view of Maimonides among the Jews, and of Warburton and others among Christian divines, was that sacrifices were not so much divinely appointed, as divinely permitted under restraints among the Jews, "lest," as it is expressed by Ephraim Syrus, "they should despise a naked religion and attach themselves to false gods." It is added in support of this view, that when religion was more fully established the prophets constantly deprecated sacrifice, but this is hardly a fair account of what the prophets did. The prophets, indeed, with one voice unite in affirming the views of sacrifice represented by Samuel in his exhortation to Saul, that "to obey is better than sacrifice," and of our Lord, who, according to Saint Matthew,

repeatedly cited the authority of the prophets for the saying that God will have mercy and not sacrifice, but it is clear that these statements were not directed against the established usage of sacrifice, but against an unreasonable reliance on them as a substitute for moral virtues.

Of the sacrifices of the Gentile nations space will not permit us to say much. They were evidently, as has been said, in many cases at least, the result of natural impulses developed by tradition, or cultivated by priestly care into a system. The powers of nature, or the most prominent objects, celestial or terrestrial, in which those powers resided, were commonly their exciting causes; while the terror of natural convulsions, and still more the disorders and miseries of human life, conjured up malevolent beings, whose wrath was only to be deprecated by blood, and sometimes by the blood of those dearest to the offerer. Here, again, human ingenuity came into play, and not animals alone, but slaves and captives, were sacrificed freely to redeem the lives of friends and kindred. Among many of the eastern nations surrounding the Jews human sacrifices were common. They were so particularly among the Phœnicians. Some traces of this barbarous custom may be found in legendary times even among the Greeks and Romans. Numerous legends hang upon the circumstance that the wrath of some divinity is only to be appeased by the sacrifice of a human victim to be recognized in some special way, or sometimes of a continued series of such victims. In one other respect only do the heathen sacrifices, including those of the Greeks and Romans, demand special notice, as differing materially from those of the Jews in the frequent inclusion among them as a sacrifice acceptable to the Deity of the chastity of women. This is always denounced in the strongest terms by the Hebrew prophets. The sacrifices of the Greeks and Romans, like those of the Jews, were either bloody or bloodless, the former usually accompanied by libations of wine and by incense. They were frequently used as a means of consulting the gods, procuring omens, etc., and consequently for political purposes.

Of the universality of sacrifice the annals of almost every people bear record. The ancestors of nearly all the existing races in Europe practised human sacrifices, and similar usages widely prevailed in Africa and America, as well as in Asia. Few religions, whether ancient or modern, have omitted sacrifices from among their rites. The Buddhists offer only first-fruits and flowers; the Mohammedans give alms, but offer no direct sacrifices. The Roman Catholic, Greek and Anglican Churches make the service of the Eucharist a service of sacrifice each in a somewhat different sense or degree. The introduction of Christianity had the effect of indirectly putting an end to Jewish sacrifices, and of directly abolishing heathen sacrifices in the Roman Empire. These latter were prohibited by the Emperor Theodosius in 381.

Of'fertory, in the Roman Catholic Church, is that portion of the service of the mass in which the priest offers to God upon the altar the bread and wine which are to be consecrated.

In the music of the mass the term offertory is used to designate the antiphon or music appropriated to that part of the service above designated.

In the Anglican Book of Common Prayer the term offertory is applied to that portion of the service during which the alms are collected among the people, whether during the service of the Holy Communion or not, while certain prescribed sentences from Scripture are being said or sung. The alms are then offered by the officiating clergyman, being laid on the altar usually with an ascriptive address to God. When the Lord's Supper is celebrated the unconsecrated bread and wine are offered at the same time.

Office, Divine (Lat. *Officium divinum*) in the Roman Catholic Church, a general designation since the 9th century for the services of the canonical hours (q.v.). These services or offices are prescribed to be said each day by bishops, priests, deacons and subdeacons in the Roman Catholic Church. See BREVIARY; LITURGY; MISSAL.

Office Fixtures. See LITERARY LABOR-SAVERS.

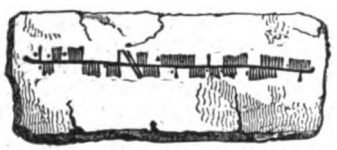
Officinal Plants (Lat. *officinalis,* of the shop, from Lat. *officina,* shop), plants which are used in medicine, and therefore sold in the druggists' and apothecaries' shops. The term "officinal" was formerly — though erroneously — used as a synonym of "official," meaning preparations recognized by the officials in charge of the compilation of pharmacopœias. Many drugs and plants which are not official are sold in the shops, and are therefore officinal.

Official plants include the anthelmintics — pinkroot, wormseed, koosso, santonin, male-fern, pumpkin-seed, etc.; the astringents — galls, catechu, kino, oak-bark, roses, geranium, blackberry, etc.; the bitters — quassia, gentian, boneset, goldthread, dogwood, wild cherry, cinchona, chamomile, snakeroot, angostura, etc.; the aromatics — cinnamon, cloves, nutmeg, allspice, cardamom, ginger, eucalyptus, etc.; the cardiacs — digitalis, veratrum, arnica, aconite, etc.; the antispasmodics — valerian, asafœtida, camphor, hops, etc.; the analgesic, opium; the mydriatics — belladonna, hyoscyamus, stramonium; the excitomotor, nux-vomica; the depressomotors — calabar bean, lobelia, gelsemium, etc.; the alteratives — colchicum, guaiac, sarsaparilla, sassafras, etc.; the emetics — ipecacuanha, squill, bloodroot, etc.; the cathartics — tamarinds, castor-oil, rhubarb, aloes, senna, colocynth, elaterium, podophyllum, etc.; the diuretics — broom, buchu, uva ursi, juniper, copaiba, cubeb, cantharides, etc.; the diaphoretic, jaborandi; the expectorants — lobelia, senega, benzoin, etc.; the demulcents — slippery elm, Iceland moss, licorice-root, sassafras, tapioca, arrowroot, sago, barley; the emmenagogues —savine, rue, parsley, apiol, etc.; the oxytocics — ergot and cotton-root; besides many others, all these being also officinal. Certain other plants are officinal, such as catnip, tansy, skullcap, liverwort, etc. Consult Potter, 'Materia Medica, Pharmacy and Therapeutics' (1902).

Og, according to the Hebrew Scriptures, the king of Bashan, defeated by the children of Israel at Edrei (Num. xxi. 33). He is said by rabbinical writers to have been one of the giants who lived before the flood, and escaped the deluge by climbing to the roof of Noah's

ark. Noah fed them that they might be to men of after times a proof of the power of God, who had created and destroyed such monsters. In the war of Og against the Israelites he took up a mountain four miles in circumference to throw down upon Israel, when it was honeycombed by ants sent by Jehovah, fell and overwhelmed him. His teeth grew so quickly that they entered the mountain and held him fast, so that Moses could kill him. To give an idea of his gigantic size, the rabbins say that Moses, who according to their account was 6 ells high, and had a battle-ax of the same length, was obliged to make a leap of 6 ells in order to strike his ankle-bone. He bled to death of the wound.

Ogam, ŏg'am, or **Ogham,** an ancient alphabet or system of lettering, formerly in use among the Celtic peoples of Ireland, Scotland, and Wales, chiefly found in inscriptions on stone, but also, though more rarely, in books. Ogams consist chiefly of straight lines, mostly vertical and oblique. horizontal lines and curves being



Ogam Inscription, from a stone found near Ennis.

sparingly used. They derive their significance partly from their position on a continuous horizontal stem-line along which they are written, some of the characters being drawn resting on the horizontal line as a base, others depending from it, and others intersecting it. This horizontal line, however, really represents a perpendicular line, namely that formed by the angle of the upright stone on which ogams were originally cut. Authorities differ as to the total number of letters represented in the alphabet, some making 16, others 25. According to some scholars a single vertical stroke resting on the line represents *h*; two contiguous strokes *d*; three *t;* four *c;* five *qu.* A single horizontal stroke depending from the line stands for *b*; two for *l*; three for *w* or *f*; four for *s*; five for *n.* The letters *m, g, ng, z* or *st, r,* are represented by one to five oblique strokes right to left crossing the line; the vowels *a, o, u, e, i,* by one to five vertical strokes crossing the line. Diphthongs are represented by curves or compound letters.

The age of this alphabet has been the subject of considerable discussion. The best authorities seem now to be agreed that it cannot be traced beyond the introduction of Christianity. The object of its construction seems not to be explained, but the most ancient ogams are all inscribed on stone. Ogams are found chiefly in Ireland, but some have been found also in Scotland, Wales, the Shetland Islands, and even in England, the total number known only amounting to about 300. The Celtic names in the inscriptions are frequently Latinized. There are numerous papers and discussions regarding them in the publications of archæological societies.

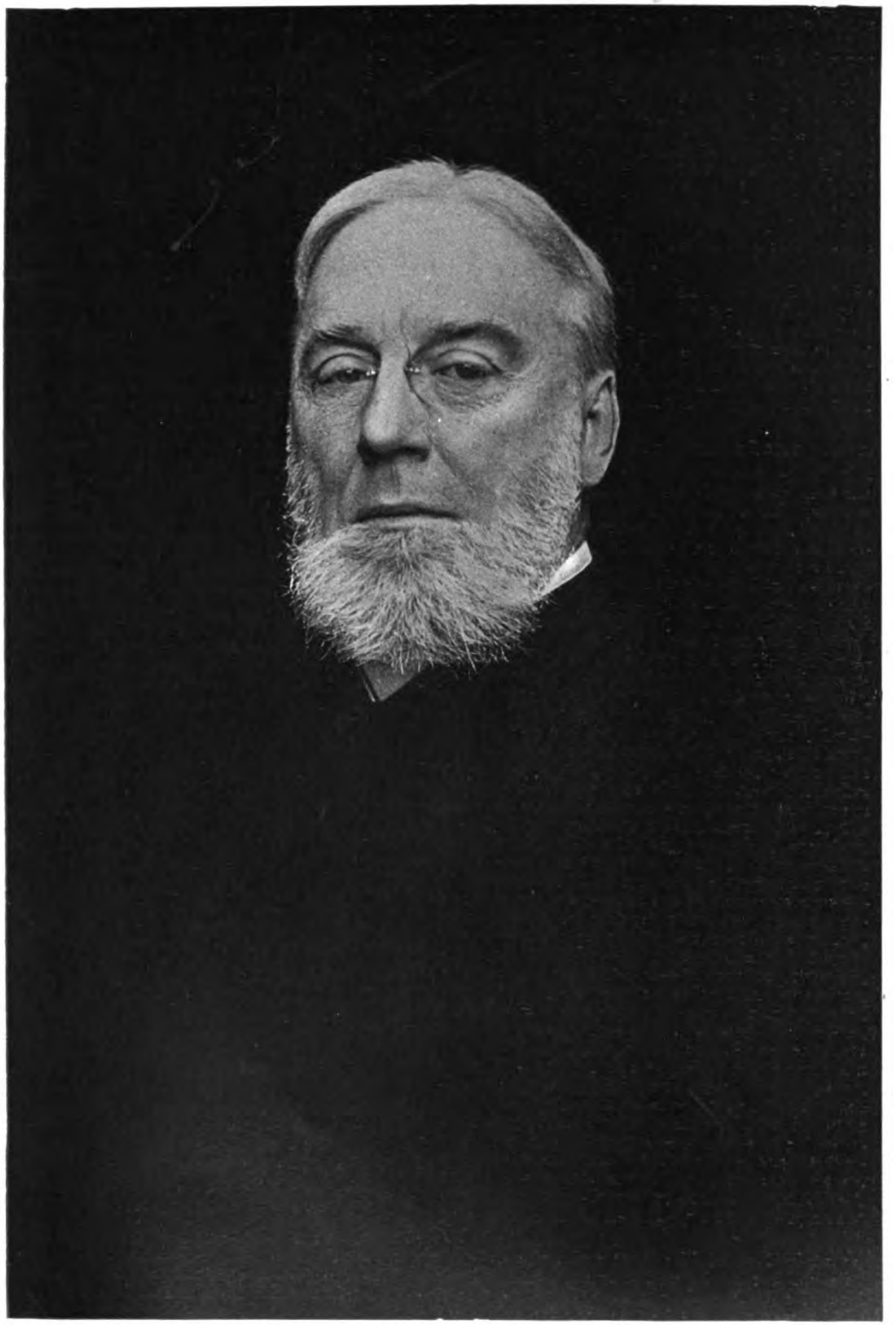
Og'den, Aaron, American soldier: b. Elizabethtown, N. J., 3 Dec. 1756; d. Jersey City 19 April 1839. He was graduated at Princeton College in 1773; in 1777 joined the army, and served with distinction during the whole Revolutionary War, serving at one time under Lafayette and obtaining the personal commendation of Washington. On the close of the war he was discharged with the rank of major, afterward practised law, and was a Presidential elector in 1800. He was one of the commissioners for adjusting the disputed boundary between the States of New York and New Jersey; from 1801 to 1803 was United States Senator; and in 1812 was governor of New Jersey. He was president of the Society of the Cincinnati during the last decade of his career.

Ogden, Francis Barber, American inventor: b. Boonton, N. J., 3 March 1783; d. Bristol, England, 4 July 1857. He was aide-de-camp to General Jackson in the battle of New Orleans; is said to have been the first to apply the principles of the expansive power of steam, and the use of right angular cranks in marine engines; and in 1813 obtained a patent for condensing engines of low pressure and with two cylinders, in which the above principles were utilized. In 1817 the first engine ever built on these lines was constructed by him in Leeds, England. The first screw propeller successfully introduced into practical use was launched by John Ericsson on the Thames, May 1837, and was called the Francis B. Ogden. The building of the first screw propeller for American waters, the iron vessel Robert F. Stockton, was superintended by Mr. Ogden in Liverpool, where he was United States consul in 1829–40. In 1840–57 he was consul at Bristol.

Ogden, Frederick Nash, American military officer: b. Baton Rouge, La., 25 Jan. 1837; d. New Orleans, La., 25 May 1886. After engaging in mercantile life from boyhood he entered the Confederate army at the outbreak of the Civil War, and subsequently became major of heavy artillery and lieutenant-colonel of cavalry. At the close of the War he resumed commercial life, and in 1868 founded the Crescent City Democratic Club, a powerful political organization. He was made major-general of State militia; and was president of the Red Cross Association of Louisiana during the yellow fever epidemic of 1878.

Ogden, Herbert Gouverneur, American cartographer: b. New York 4 April 1846. He was educated in private schools; in 1863 was appointed an aid in the United States Coast and Geodetic Survey and an assistant in 1869. He served with the army on the defenses of Washington in 1864, accompanied the Nicaragua expedition in 1865, and the earliest naval exploring expedition to the Isthmus of Darien in 1870 as topographer, and had charge of the party sent to locate the international boundary between British Columbia and Alaska, in 1893. He is a recognized expert in topography and cartography.

Ogden, Robert Curtis, American merchant and philanthropist: b. Philadelphia, Pa., 20 June 1836. Since 1885 he has been a retail merchant as a member of the John Wanamaker firm. He is best known by his work in behalf of the cause of education in the South. He is president of the board of trustees of Hampton Institute, a trustee of Tuskegee Institute, and president of



ROBERT C. OGDEN,

PRESIDENT OF THE SOUTHERN EDUCATION BOARD.

Main

the Southern Educational Board and the Conference for Education in the South. His work in this line has been everywhere recognized as most efficient, his efforts being directed chiefly toward providing education for both negroes and illiterate whites through Southern agencies and in friendly co-operation between Northerners and Southerners. In 1903 Tulane University gave him the degree of LL.D. in recognition of his services. He has published 'Samuel Chapman Armstrong,' the Founder's Day address at Hampton Institute, 1894; 'Pew Rents and the New Testament' (1892); 'Sunday School Teachers' (1894).

Ogden, Ruth. See IDE, FANNIE OGDEN.

Ogden, Utah, city, county-seat of Weber County; at the junction of the Ogden and Weber rivers, and on the Southern P., Union P., Rio Grande W., Oregon S. L., and Ogden & N. W. R.R.'s; about 35 miles north of Salt Lake City, and 10 miles from Salt Lake. It was founded in 1848 and in 1850, under the direction of Brigham Young (q.v.), it was laid out as a city. In 1851 it received its charter. The charter now (1904) governing the city is in accordance with the general law of the State for the government of cities and was passed by the Legislature in 1898. It is in a fertile agricultural region, and in the vicinity of valuable mines. The opening of the Ogden Cañon is at the city limits, and its grand and picturesque scenery brings many tourists to the place. The water-power of the falls is used for the electrical works which supply power, light, and heat for Ogden and Salt Lake City. The chief industrial establishments are canneries, pickle factories, beet-sugar factory, woolen mills, broom factory, and brick and tile yards. It has an extensive trade in its manufactures and farm products, and is the distributing centre of quite a region with which Ogden is connected by railroads. The educational institutions are the State Industrial School, State Institutions for the Deaf, Dumb, and Blind, the Weber State Academy (Mormon), the Sacred Heart Academy (R.C.), and public and parish schools. The government is vested in a mayor, who holds office two years, and a council. The mayor appoints, subject to approval by the council, the administrative officials except the treasurer, clerk, auditor, police justice, and attorney, who are elected by the people. Pop. (1890) 14,889; (1900) 16,313.

Ogdensburg, N. Y., city, port of entry, in Saint Lawrence County; at the confluence of the Saint Lawrence and Oswegatchie rivers, and on the New York C. & H. R., and the Rutland R.R.'s; about 170 miles, in direct line, northwest of Albany, the State capital. It is connected by ferry with Prescott, Ont. It is at the foot of the deep-water navigation of the Great Lakes, and has unusual facilities for transportation. It has direct connection by rail with New York city and Boston, and steamer connection with all the lake and river ports. Shipping and wholesale dealing in lumber, grain, and coal are the most prominent industries. Several fleets of vessels are owned here. Other important industries are the manufacturing of silk, flour, gloves, dress skirts, leather and brass goods, lumber and lumber products. The importations at the port of entry, for 1903, amounted to $17,251,981; exportations, $4,543,346. The value of the raw silk imported was $13,839,998. The amount of lumber cleared was 113,315,000 feet. The number of vessels which arrived was 1,880; departed, 1,757, with aggregate tonnage of 925,399. The custom dues amounted to $294,266.89. The prominent public buildings are the custom-house, a beautiful town-hall, an opera house, two handsome club houses, a State armory, and seven large churches, including the Roman Catholic Cathedral. Among the charitable institutions the most prominent is the Saint Lawrence State Hospital for the Insane; established and equipped at a cost of several millions, and supervised and superintended by specialists, it is an exponent of world's most effective and humane treatment of the insane. Other institutions are the City Hospital, United Helpers' Home, Saint John de Deo's Hospital (quarantine hospital), an orphanage and a home for the aged. The educational institutions are Saint Mary's Academy (free), public school free academy, public and parish schools, and a public library. The library is built on a site of great beauty, on the river front, and surrounded by several acres of green lawn and trees. The building cost $50,000 and was paid for by the citizens of the city. By an act of the Legislature, in 1901, the corporate limits of the city were extended. Pop. (1890) 11,662; (1900) 12,633; (1904) over 14,000.

FRED VAN DUSEN, PH. D.,
Principal Ogdensburg Free Academy.

Ogé, Jacques Vincent, zhäk văń-sŏń ō-zhā, Haitian revolutionist: b. Dondon, Haiti, about 1755; d. Hayti 1791. He was a mulatto, but was born free and as a young man served in a German army there. In 1789 he represented Haiti in the Constitutional Assembly and when he returned to Haiti he took up the cause of the slaves. Unsuccessful in his petitions to the Assembly, he formed a company and in 1790 led a revolt. He was victorious in several battles, but was ultimately defeated; the plea that his life should not be forfeited if he surrendered was disregarded and he was tried and sentenced to death.

Ogee, ō-jē', in architecture, a molding consisting of two members, one concave and the other convex. An ogee arch is a pointed arch, the sides of which are each formed with a double curve. It is generally introduced over doors, niches, tombs, and windows, its inflected curves weakening it too much to permit of its application for the support of a great weight.

Ogeechee, ō-gē'chē, a river in Georgia, has its headwaters in Greene County, flows southeast into Ossabaw Sound, a course of about 200 miles. Savannah is 17 miles north of the mouth of the river. Where the waters enter the sound a number of islands have been formed, largest of which is Ossabaw. The river is navigable for small steamers for some distance from the ocean.

Oggione, Marco da, Italian painter: b. Oggiono, Lombardy, about 1470; d. between 1530 and 1540. He studied religious painting under Leonardo da Vinci as early as 1490, and was the oldest of that master's scholars. One of the finest of his pictures is 'The Three Archangels' in the Brera at Milan. He is, however, best known for his copies of 'The Last Supper' of Leonardo, one of which is at the Royal Academy, London, another in the Convent of Castellazzo, near Milan, and a third at Saint Petersburg. The pretty picture at

Hampton Court of 'The Infant Christ and Saint John Kissing,' generally attributed to Leonardo, is undoubtedly the work of Oggione whose creations are not unfrequently credited to his greater teacher.

Ogilvie, ō'gl-vĭ, **Clinton,** American painter: b. New York 28 Dec. 1838. After studying under James McDougal Hart (q.v.), he started on his student-travels in Europe, and spent much time in the art galleries and studios of Paris (1866, 1872–3). In 1864 he was elected an associate of the National Academy. He has been successful as a landscape painter and has generally gone to Switzerland or France for his subjects. His best known pictures include: 'The Valley of Schwytz, Switzerland'; 'Lake Como near Bellagio'; 'Among the Adirondacks'; 'At Eaux Bonnes, France'; 'Argelès'; and 'Saint Barthelemy, near Nice.'

Oglesby, ō'glz-bĭ, **Richard James,** American soldier and lawyer: b. Oldham County, Ky., 25 July 1824; d. Elkhart, Ill., 24 April 1899. He removed with an uncle to Decatur, Ill., in 1836, studied law there while engaged in the carpenter's trade and gained admission to the bar in 1845. He served in the Mexican War with the rank of lieutenant and later entered the Louisville Law School, where he was graduated in 1848. In 1851 he resumed his law practice in Decatur, Ill., and in 1860 was elected to the State senate from which he resigned to enter the Union army. At Forts Donelson and Henry he performed distinguished service and in 1862 was promoted brigadier and later major-general of volunteers. He was at the battles of Pittsburg landing and Corinth and was compelled to resign in 1864 because of his wounds. In 1865–9 he was governor of Illinois, and in 1872 was re-elected but declined the office to become United States senator in 1873–9, and was again governor in 1885–9.

Oglethorpe, ō'gl-thôrpe, **James Edward,** English soldier and colonist: b. London 21 Dec. 1696; d. Cranham Hall, Essex, 1 July 1785. In 1714 he joined the army of Prince Eugène, as aide-de-camp, whom he served with distinction in the campaign against the Turks, 1716–17, especially at the siege and capture of Belgrade (q.v.). In 1722 he was sent to Parliament as member for Haslemere. Becoming acquainted with the abuses of the debtor's prison in London, he made them known to Parliament, and was appointed chairman of a committee for their investigation. His work in behalf of insolvent debtors, thus begun, was continued in his project for their colonization in North America, in connection with which he also aimed at an asylum for oppressed Protestants of the European Continent. With others, in 1732, he obtained a charter for a tract of land between the Altamaha and Savannah rivers, and in January 1733 Oglethorpe, with a party of colonists, arrived at Charleston; soon afterward he founded Savannah (q.v.), and for 10 years he served as governor of the colony of Georgia, named in honor of George II. By his defense of the colony and neighboring territory of the South against encroachments of the Spaniards and Indians from Florida, and his efforts to secure the trade of the Cherokees, he rendered services to England quite beyond the ordinary work of colonial administration, and for Georgia laid the foundation of a stable commonwealth. Besides the defenses which he gathered in the colony, in 1738 he brought a regiment of volunteers from England, and in the war of Jenkins' Ear (see COLONIAL WARS IN AMERICA), he vigorously laid siege to Saint Augustine, but the inadequacy of his force prevented him from capturing the place. He achieved an important success in holding Amelia Island against the Spanish attack, and another by his victory at Frederica. In 1743 Oglethorpe returned to England, and two years later was made major-general, having been acquitted of charges brought against him for the failure of his attempt at Saint Augustine. He had brought himself into financial straits by advancing money for defensive needs in Georgia. In 1745 he served against the Stuart invaders, and pursued the Jacobite fugitives, was court-martialed for failing to overtake them, but honorably acquitted. Oglethorpe and his fellow trustees of Georgia surrendered their charter in 1752, and the colony became a royal province. In 1765 he was raised to the rank of general in command of all the king's forces. His interest in American affairs never abated, and he was one of the first to wait upon Mr. Adams, after his arrival in England as ambassador, to whom he expressed his esteem and regard for America, and his satisfaction at the termination of the difficulties between Great Britain and her colonies. Consult: Sparks, 'American Biography,' 2d series, Vol. II., for a memoir of Oglethorpe by W. B. O. Peabody; Wright, 'Memoirs of James Oglethorpe' (1867); and Lecky, 'England in the 18th Century,' Vol. I. (1879).

O'Gor'man, Thomas, American Roman Catholic bishop: b. Boston, Mass., 1 May 1843. He was educated in the United States and in France; entered the priesthood and held pastorates at Rochester, Minn. (1867–78); and at Faribault, Minn. (1882–5). He was first president of the College of St. Thomas, St. Paul, Minn., and professor of dogmatic theology; and professor at the Catholic University of America, Washington, D. C., 1890–5. In 1896 he was consecrated bishop of Sioux Falls. He has published 'A History of the Roman Catholic Church in the United States' (1895).

Ogowai, ō-gō-wâ', or **Ogové,** ō-gō-vā', Africa, a river of the French Kongo, with a densely forested and wide delta on the western coast near Cape Lopez. Its sources are in the Cristal Range, about 130 miles west of Stanley Pool, and it reaches the Atlantic after a northwesterly, circuitous course of about 700 miles, 200 miles of which from the mouth are navigable by small steamers, the remainder being impeded by numerous rapids. It has several tributaries, the chief of which are the Ivindo and the Lolo. The river was discovered by Du Chaillu in 1856, and has been explored by French travelers, including De Brezza, Fourneau, and Lesieur.

Ogul'nian Law, in ancient Roman history, a law passed by the tribunes about 300 B.C., by which the office of pontiff and augur were thrown open to the common people.

Ogyges, ŏj'ĭ-jēz, in Greek mythology, the most ancient ruler of Attica. The building of Thebes is ascribed to him, and one of the gates of the city was named after him. Under the reign of Ogyges happened the Ogygian deluge, which laid waste all Attica.

O'Hara, ō-hăr'a, **Theodore,** American soldier and poet: b. Danville, Ky., 11 Feb. 1820; d. near Guerryton, Barbour County, Ala., 6 June 1867. At one time an officer in the United States Navy, he was connected with the Lopez and Walker movements, and served as captain and major in the Mexican War. In the Civil War he was a colonel in the Confederate service. His famous poem, 'The Bivouac of the Dead,' was written in commemoration of the Kentuckians killed in the battle of Buena Vista during the war with Mexico.

O'Higgins, ō hĭg'ĭnz (Sp. ō-ē'gēns), **Ambrosio,** South American administrator: b. County Meath, Ireland, about 1730; d. Lima, Peru, 18 March 1801. His real name was Ambrose Higgins. His uncle, who was a Spanish priest, had charge of his education and sent him to South America. He went to Buenos Ayres first and then to Chile, where he was a trader and peddler for several years. He entered the Spanish army, distinguished himself in the Araucanian wars, and rapidly rose in rank until in 1788 he was made captain-general of Chile. His rule there proving very successful, he was given the title of Marquis of Orsino, and appointed viceroy of Peru in 1796, where he also proved an excellent ruler.

O'Higgins, Bernardo, Chilean soldier and dictator: b. Chillan, Chile, 20 Aug. 1776; d. Lima 24 Oct. 1842. He was a natural son of Ambrosio O'Higgins (q.v.). He was educated in England, where he became a republican under the influence of Miranda and others. He returned to Chile in 1802, and in 1810 joined the Chilean revolutionists; in 1813, when Carrera was deposed from the supreme command of the army, O'Higgins was appointed to succeed him. He met with constant opposition from Carrera and his faction, and civil war was imminent, when a Spanish army from Peru entered the country, and the two factions combined to withstand the Spanish attack. The Chileans under the command of O'Higgins met the Spaniards at Rancagua, 2 Oct. 1814, and were defeated on account of Carrera's failure to bring the reinforcements expected. The leaders fled across the Andes, but O'Higgins in 1817 joined the invasion under San Martin, as one of the chief lieutenants. The charge under his leadership decided the Chilean victory at Chacabuco, 12 Feb. 1817. He was then made dictator of Chile — after San Martin had declined the office — and under his rule the independence of Chile was formally declared and the Spaniards driven out. His administration was an efficient one, but his republican sentiments and his attempts to establish a representative constitutional government aroused the opposition of the aristocrats. The aristocratic party, joined by the adherents of Carrera, rebelled and finally deposed him in 1823, and he then went to Lima, Peru.

O'Higgins, Chile, an inland province bounded north and west by Santiago, by Argentina on the east, and by Colchagua on the south. Area, 2,524 square miles. Capital, Rancagua (q.v.). The surface in the west is level and is devoted to agriculture and pasturage; in the east the country is on the slope of the Andes and in this mountainous region gold and other metals are mined. The principal rivers are the Maipo and the Raipel. Pop. (1895) 85,277.

Ohio (Iroquois, *Ohionhiio,* "beautiful river," popular name, BUCKEYE STATE), a State in the north central part of the United States; bounded on the north by Michigan and Lake Erie, on the east by Pennsylvania and West Virginia, on the south by West Virginia and Kentucky, on the west by Indiana. The boundary lines dividing Michigan and Indiana from Ohio, and Pennsylvania from Ohio to the Ohio River, are straight lines, the southern and southeastern boundaries are formed by the Ohio River. The State is between lat. 38° 27′ and 41° 57′ N. and lon. 80° 34′ and 84° 49′ W. The maximum length, north and south, is 210 miles, and, east and west, 215 miles. The area is 41,060 square miles, of which 300 square miles are water surface. In size it ranks thirty-second among the States, and was the fourth State admitted into the Union.

Topography.—That portion of the State bordered by the Ohio River and Lake Erie has an irregular boundary. The course of the Ohio along the border is 436 miles; the lake shore is 230 miles, giving the State a navigable water front of 666 miles. The largest inlets from Lake Erie are Sandusky and Maumee bays. In the portion of the Lake between those bays are a number of islands, several of which belong to Ohio. The general surface of the State is a rolling plain, from 300 to 500 feet above Lake Erie, or from 900 to 1,200 feet above the sea. Some portions have an altitude of 1,500 feet; in Logan County, the western part of the State, is the highest point, 1,540 feet altitude, and the lowest is the shore of the Ohio near Cincinnati. The divide between the rivers of Lake Erie and those of the Ohio River is a low ridge which crosses the State from the middle of the western border, in Mercer and Darke counties, to near the northeastern boundary, in Trumbull County. The river channels are cut deep in many parts of the State and many of the banks are massive rugged rocks and huge boulders. The best harbors on the lake shore are Ashtabula, Cleveland, Sandusky, and Toledo.

Hydrography.—There are two drainage basins in the State; the one sloping north toward Lake Erie, and the other south toward the Ohio. The rivers flow through valleys, some of which were at one time flood plains, but many of the streams have cut channels from 100 to 200 feet in depth and flow through low valleys. The Ohio River is in some places from 500 to 600 feet below the hills on either side and a considerable distance below the tops of the banks. The streams which flow south are the longest and deepest. The largest are the Muskingum, Mahoning, Hocking, Scioto, Little Miami and Great Miami. The longest wholly within the State is the Muskingum. This river has been made navigable by slackwater and other improvements for about 100 miles from its mouth. The chief rivers in the northern basin are the Maumee, Portage, Sandusky, Huron, Vermilion, Black, Rocky, Cuyahoga, and Chagrin. Many of the rivers of the State furnish considerable water-power and are a great aid in the development of manufacturing industries. There are no large lakes in the State, but in many parts there are groups of small lakes noted for their beauty. In Summit County there are several small lakes. The buried river channels which are found in many places in Ohio are of interest to the geologist.

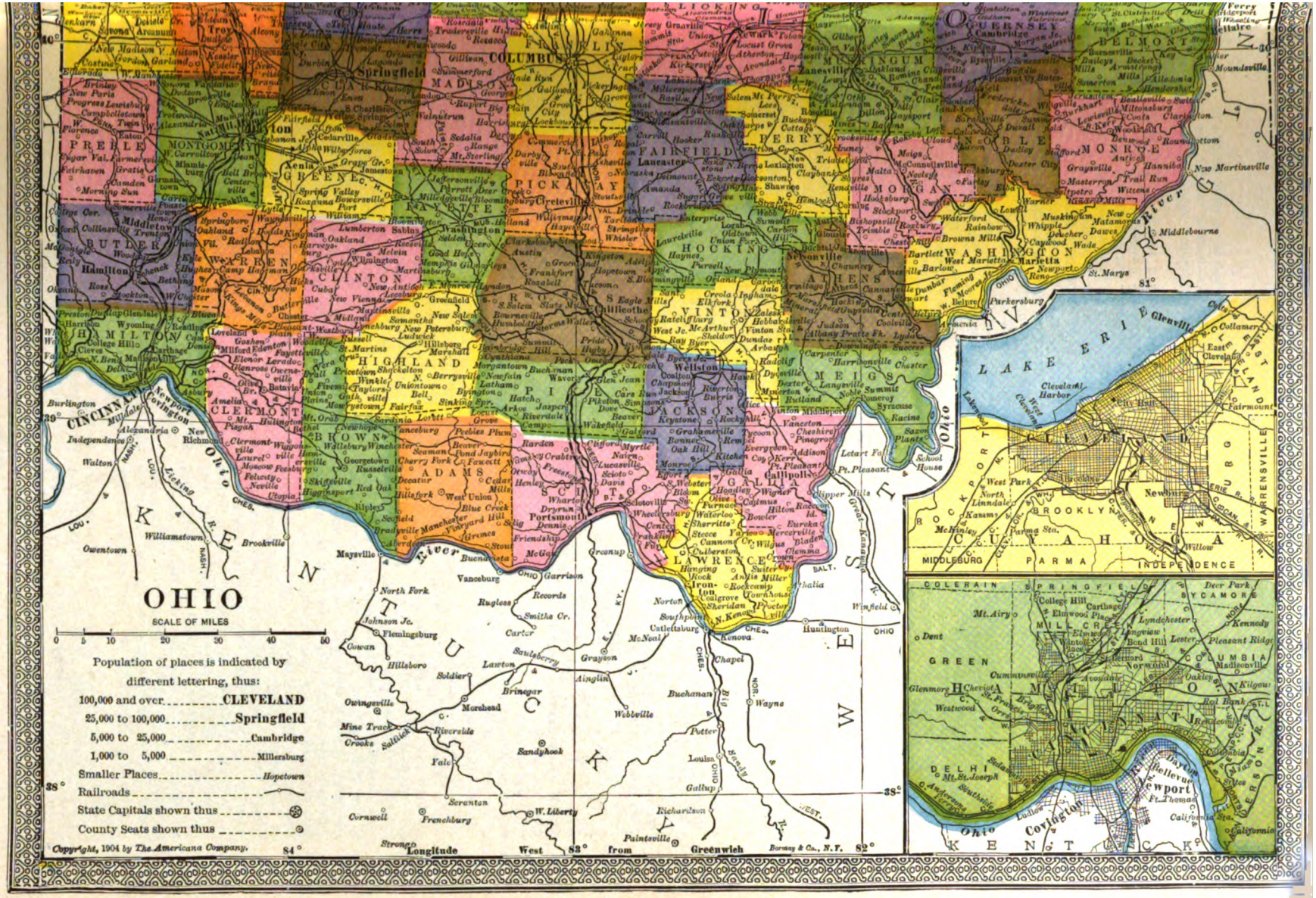
These channels have been filled in by sand, gravel, etc., and now the waters of rivers that once followed deeply excavated channels, are flowing over beds far above their former bottoms.

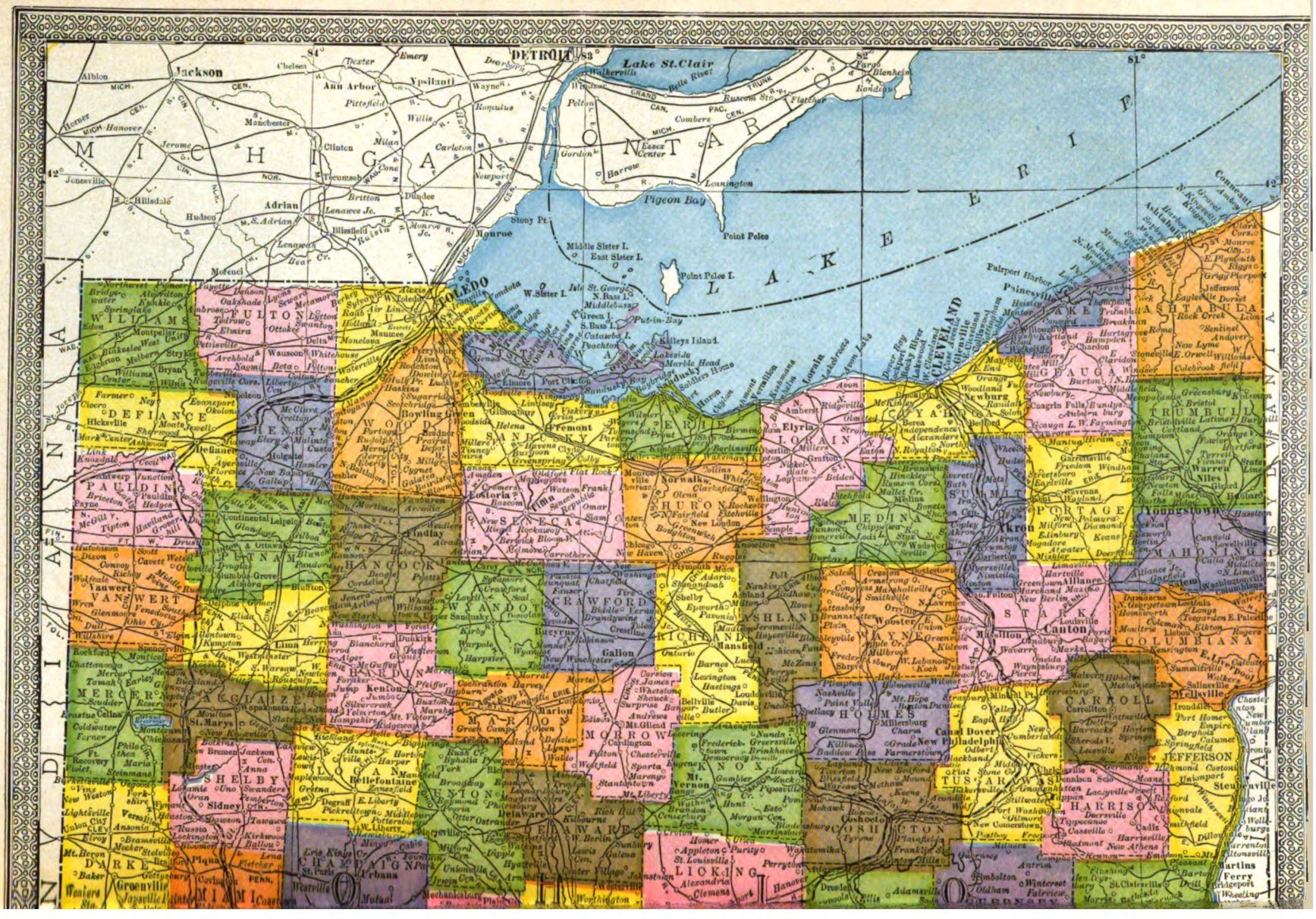
Geology.—There are no great breaks of the strata, nor any great variations in the geological structure of the whole State; the underlying sedimentary rocks show only a slight inclination from the horizontal. There is a broad fold whose axis extends from the northeastern part of Indiana southeast to near Cincinnati, then crosses into Kentucky, extending to about the central part. This is called the Cincinnati Arch or anticlinal. From this arch the strata dip westward to the coal fields of Illinois and south and southeast under the Alleghany coal fields. The elevation of this arch must have occurred at the close of the Lower Silurian period and prior to the beginning of the Upper Silurian period. The geological formations which are exposed are the Lower and Upper Silurian, the Devonian, the Carboniferous, and the drift. In the Lower Silurian near Cincinnati may be found the oldest rocks, called the Cincinnati Group. In but few localities is there found such a variety and richness of the fossil remains as in the beds of limestone and clay or marl in this vicinity. On the crown of the Cincinnati Arch, near the northern part, the formations of the Upper Silurian area may be seen. Near Sandusky is the Salina group, the formation containing salt as at Syracuse, N. Y. Here also are beds of gypsum. In the western part and on the islands of Lake Erie is the water lime which is found in the Helderberg region of New York State. It flanks the Cincinnati Arch on each side. The corniferous limestone, the chief element of the Devonian in the State, forms two outcropping belts on opposite sides of the Cincinnati Arch, one crossing the northwest corner of the State, and the other extending from Sandusky to Columbus. Corniferous limestone forms the surface rock of Kelley's Island. This same rock is quarried at Kelley's Island, Sandusky, Columbus, and other places in the State. The capitol at Columbus is built of this stone. In the corniferous rocks at Sandusky and Delaware are found the remains of fossil fish. The black shale, similar to that found in the Genesee Valley in New York State, is in the northwest corner of the State, and also a belt from 10 to 20 miles wide, extends from the mouth of the Huron River to the Ohio. It is a black bituminous shale containing from 10 to 20 per cent of carbonaceous matter. It is the source of a large part of the oil and gas of Ohio. In this shale are found the remains of large fossil fishes. Bordering on the lake shore from the Pennsylvania line is a mass of shale, the upper member of the Devonian, and the continuation of the formations found in the Portage and the Chemung Valley of western New York. The eastern part of the State is underlaid by the Carboniferous formation, an extension of the great Alleghany coal fields. The coal measures are composed of strata of shale, sandstone, coal, limestone, and fire clay with iron ores are found in the eastern and southeastern part. These coal measures have an area of 10,000 square miles in Ohio. There are no formations later than the Carboniferous until the period of the Glacial drift. All the State except the southeastern portion was covered with ice. The drift deposit in many places is several hundred feet deep. The Great Lakes once overflowed much of the State, as may be traced by the existing raised beaches.

Minerals and Mining.—It has been estimated that at the present rate of consumption the State has bituminous coal enough to last 1,000 years. Fire clay of a superior qualify forms the interbedding strata of the coal measures. Building stone and the carbonate variety of iron ore are also found here. The salt and gypsum deposits near Sandusky have already been mentioned. Petroleum was discovered in 1884 in the Trenton limestone formation of the Lower Silurian period, and both the Lower and Upper Silurian formations had reservoirs of gas. The coal output of the State was, in 1880, 6,000,000 tons, and, in 1900, 18,988,150, or 7 per cent of the total output of the United States. The number of employees engaged in the coal industry of the State, in 1900, was about 27,700. The petroleum industry since 1885 has been most important. There are two distinct petroleum districts:—one, the Lima district, in the northwest, is the more important,—the other, called the Eastern district, is in the southeast. Lubricating oil is obtained in what is called the Mecca-Belden district. There are two gas fields in the State; that in the Eastern district was the first developed in the seventies. The gas was used wastefully and in a few years the supply was almost exhausted. In 1880 the natural gas of the Eastern district used for light and fuel was valued at $5,000,000; in 1885 the value of the product consumed from the same district was $100,000. About 1885 the gas fields near Findlay, in the northwest, began to attract attention. Until 1889 the output of the northwest increased annually; then it began to decrease gradually until 1898, since when the annual output has increased. The value of the natural gas product of the Findlay district in 1900 was $2,178,234. The Pennsylvania and Indiana outputs, from 1890 to 1900, exceeded that of Ohio, and since 1899 the West Virginia output has also been greater than Ohio.

The annual value of the clay products of Ohio is greater than for any other State in the Union; in 1900 the State contributed 17.3 per cent of the total output of the clay products of the United States. The value of the clay products of Ohio, in 1890, was $10,860,934, and in 1900, $18,504,628. Of the amount for 1900, $9,731,305 were for brick and tile and the remainder for pottery. Ohio has a large sandstone product, and in this ranks first in the Union. The value of the sandstone products in 1900 was $2,223,596. The State supplies over three fourths of all the grindstones and whetstones used in the country. The value of the sandstone product for 1900 was not equal to that of some of the earlier nineties by about $700,000. The mining of iron ore is not as important an industry as in former years; but Ohio ranks first in the value of carbonated iron ore. Limestone is an important product of Ohio, and large quantities of cement are manufactured each year. There are a number of mineral springs in the State, but the output from only 15 were reported in the Federal census of 1900. In 1900 the State ranked fourth in the production of salt.

Climate.—The climate while temperate is variable, and great extremes occur; but neither excessive heat nor cold is of long duration. The


OHIO
SCALE OF MILES
0 5 10 20 30 40 50
Population of places is indicated by different lettering, thus:
100,000 and over ..... CLEVELAND
25,000 to 100,000 ..... Springfield
5,000 to 25,000 ..... Cambridge
1,000 to 5,000 ..... Millersburg
Smaller Places ..... Hopetown
Railroads
State Capitals shown thus
County Seats shown thus
Copyright, 1904 by The Americana Company.
Longitude West from Greenwich
LAKE ERIE
CLEVELAND
CUYAHOGA
BROOKLYN
PARMA
INDEPENDENCE
MIDDLEBURG
CINCINNATI
KENTUCKY
Ohio River
COLUMBUS
Springfield
Dayton
Hamilton
Middletown
Zanesville
Marietta
Portsmouth
Ironton
Huntington
Newport
Covington
Maysville
Ashland
Parkersburg
St. Marys
Middlebourne
Martinsville
Williamstown
Brookville
Owentown
Vanceburg
Fleming
Flemingsburg
Hillsboro
Owingsville
Morehead
Mine Track
Crooks
Soldier
Lawton
Brinegar
Grayson
Carter
Smiths Cr.
Rugless
Records
North Fork
Johnson Jc.
Cowan
Sandyhook
Riverside
Yale
Scranton
Cornwell
Frenchburg
W. Liberty
Paintsville
Richardson
Louisa
Gallup
Potter
Buchanan
Wayne
Webbville
Chapel
Ainglin
Kenova
Catlettsburg
Ashland
Greenup
Garrison
Winfield
Ohio
Kentucky
West Virginia


MICHIGAN
ONTARIO
LAKE ERIE
Lake St.Clair
DETROIT
TOLEDO
CLEVELAND
Jackson
Ann Arbor
Ypsilanti
Monroe
Adrian
Hillsdale
Jonesville
Coldwater
Sandusky
Pigeon Bay
Point Pelee
Middle Sister I.
East Sister I.
Point Pelee I.
W.Sister I.
Isle St.George
Green I.
Put-in-Bay
Kelleys Island
Stony Pt.
Leamington
Harrow
Essex Center
Gordon
Pelton
Walkerville
Belle River
Windsor
Ruscom Sta.
Fletcher
Blenheim
Fairport Harbor
Painesville
Conneaut
Ashtabula
Jefferson
Rock Creek
Andover
New Lyme
Orwell
Williamsfield
Geneva
Madison
Perry
Painesville
Mentor
Willoughby
Euclid
Chardon
Middlefield
Burton
Newbury
Cuyahoga Falls
Akron
Canton
Alliance
Massillon
Wooster
Mansfield
Ashland
Norwalk
Sandusky
Elyria
Lorain
Medina
Warren
Niles
Youngstown
Hudson
Ravenna
Kent
Ravenna
Garrettsville
Windham
Mantua
Hiram
Aurora
Streetsboro
Twinsburg
Northfield
Bedford
Berea
Olmsted
Rocky River
Lakewood
Cleveland
Euclid
Collinwood
Nottingham
Shaker Heights
Cleveland Heights
Newburgh
Orange
Woodland
Randall
Solon
Chagrin Falls
Bentleys Corners
Auburn
Chagrin
Gates Mills
Hunting Valley
Pepper Pike
Orange
Moreland Hills

MAU

maximum temperature is 107.9° and the minimum 34° below zero. The northern part of the State has a longer and colder winter than the southern part; but the winters are not severe in any part of the State. In the northern part, near the Lake, sudden changes of temperature occur, especially during the summer season. The mean temperature for July is 73°, for January 26°. The rainfall is evenly distributed and of an amount generally conducive to the growth of farm products. The annual rainfall averages 39.35 inches. The climate is healthful; the winds which are at times a disturbing element as regards temperature, serve to keep the climate of the State as a whole remarkably healthful.

Soil.—The soil of nearly two thirds of the State is the deposit of the drift or quaternary, and nearly all of such soil is fertile. In the southeastern part the soil is composed of the decomposed sub-rock structure. In the northeast the clay soils are found in many counties and in the west there is a large percentage of limestone; along the rivers are alluvial soils.

Forests and Forest Products.— The western part of the State was once covered with forests, the hardwood variety of timber, used in building, was abundant. The ash, elm, beech, and varieties of cedar, pine, chestnut, maple, oak, and in some parts walnut were found. In the western part the prairie zone begins. The total extent of forests in 1900 was 9,300 square miles, which was 23 per cent of the total area. The wood products of Ohio were noted for their good quality, when the raw material was obtained from the forests of the State. In 1900 there were 2,054 lumber and timber manufactories, and the value of the product for the same year was $20,790,854. The value of the lumber and planing mill products, including sash, doors, and blinds, for the same year was $11,066,671; the value of the furniture products was $9,514,764; and of paper and wood pulp, $6,543,513.

Flora.— See UNITED STATES.

Fauna.— See UNITED STATES.

Agriculture.—The Federal census of 1900 reports 93.9 per cent of land area devoted to farming, and the improved land as 78.5 per cent of the farm area. The waste land has been reduced to a minimum. The large number of manufacturing towns and cities, making a ready market for farm and dairy products, has greatly influenced the agricultural development of the State, and has been one of the chief causes of the increase of improved land acreage from decade to decade since 1850. The average size of the farm in 1890 was 125.2 acres, and in 1900, 88.5 acres. In 1900 the number of farms occupied and operated by tenants was 27.5 per cent of the whole number in the State. There were, in 1900, about twice as many farms leased on shares as were rented for cash. Fertilizers are in general use, and are increasing. In 1900 the cost for fertilizers averaged about $10 per farm.

The agricultural products are varied, some seem to grow well in all parts of the State. The clay soil of the northeast is well adapted to wheat, but wheat is raised in other sections. In 1900 the leading crops were corn, wheat, and hay. The corn acreage was 3,826,013; the wheat, 3,209,074; the hay, 3,015,261. Oats ranked next with an acreage of 1,115,149. The tobacco acreage was 71,422; potatoes, 167,590. Rye, buckwheat, and barley had a combined acreage of 64,714. From 1890 to 1900 the corn acreage had increased 20 per cent, the wheat acreage 41.4 per cent, and tobacco, 61.2 per cent. Nearly one half of the area devoted to tobacco, in 1900, was in Darke and Montgomery counties. The potato product is large and of an excellent quality. Other vegetables grown extensively are cabbage, sweet corn, and tomatoes. The State is noted for its extensive orchards. In 1900 the apple crop was 20,600,000 bushels. Peach, pear, plum, and prune trees had increased greatly in number from 1890 to 1900. Large vineyards are in the region near Lake Erie, and small fruits are cultivated in all parts of the State.

Stock-raising.— The receipts from the dairy products in 1900 were $15,484,849. Of this amount $8,303,626 was from sales of milk. From 1890 to 1900, the amounts derived from the sales of milk had increased 30.3 per cent. The number of dairy cows increased from 794,833 in 1890 to 818,239 in 1900; and other cattle from 968,554 in 1890 to 1,235,074 in 1900. During the same decade there was a decline in the number of horses, mules and asses, and swine. For several years Ohio led in the number of sheep. In 1890 the number was 4,060,729, and in 1900, 2,648,250; the fleeces had increased in weight. The sales from wool, in 1899, amounted to $4,299,025. Poultry is increasing, especially near the large cities. The laws of the State looking to the prevention of the spread of diseases among stock, are rigidly enforced, as are also the laws relating to purity of dairy products.

Manufactures.—According to the census of 1900, Ohio ranked first in the United States in the manufacture of carriages, wagons, and supplemental materials, and in pottery and clay products: it was second in the manufacture of agricultural implements of iron and steel, and of food preparations; third in flouring and grist mills products, in the roasting and grinding of coffee and spices, in foundry and machine shop products, distilled liquors, soap and candles, and tobacco, cigars, and cigarettes; fourth in the factory product of boots and shoes, of women's clothing, in the manufacture of glass, of rubber and elastic goods, in refining petroleum, and in cars and general shop construction and repairs by steam railroad companies; and fifth in the factory product of men's clothing, electrical apparatus and supplies, malt liquors, lumber and planing mill products, including sashes, doors, and blinds, in book and job printing and publishing, and in the printing and publishing of newspapers and periodicals. In the value of all manufactures, Ohio ranked fourth among the United States from 1840 to 1880, but in the latter year was surpassed by Illinois, and became fifth, holding that rank ever since. From 10,622 manufacturing establishments with a capital of $29,019,538 in 1850, Ohio had increased to 20,699 establishments with a capital of $188,939,614 in 1880, and to 32,398 establishments with a capital of $605,792,266 in 1900; the average number of wage-earners in the years stated were, respectively, 51,491, 183,609, and 345,869, and the total value of products, including custom work and repairing, was respectively, $62,692,279, $348,298,390, and $832,438,113.

The establishments of 27 leading industries,—including besides those enumerated in the above paragraph, slaughtering and meat packing, the manufacture of furniture, and of paper and wood

pulp,—had increased from 7,997, with a capital of $268,343,244, and an annual output valued at $402,134,891 in 1890, to 9,557, with a capital of $403,595,111, and an annual output valued at $547,619,814 in 1900. The manufacturing importance of the State is due to its ample natural resources as detailed under *Minerals and Mining*, and *Forests*, and their accessibility by waterways and rail, which led to an early introduction of domestic manufactures along with the chartering of a trading and banking company in 1803. Cleveland and Cincinnati are the chief industrial centres. Cincinnati long held the lead, but has apparently attained its maximum, while Cleveland is still increasing. From 1800 to 1850 Cincinnati was the centre of an extensive hog raising region, and during that period was the most important meat-packing city in the United States; the manufacture of tobacco is also a leading industry of Cincinnati. The manufacture of foundry and machine shop products, including engines, boilers, and machinery of many varieties, is carried on extensively in all the leading cities of the State, but chiefly at Cleveland and Cincinnati. Youngstown, in the Mahoning Valley, is the leading city in the State in the iron and steel industry. Mining machinery is made at Columbus and Akron, machine tools at Hamilton. Pottery is produced at Cincinnati, Akron, Zanesville, Roseville, and East Liverpool, the last town manufacturing over 49 per cent of the white granite ware and semi-vitreous porcelain of the United States. Toledo is one of the granaries of the country with important flouring and grist mills, and Springfield and Canton lead in the manufacture of agricultural implements.

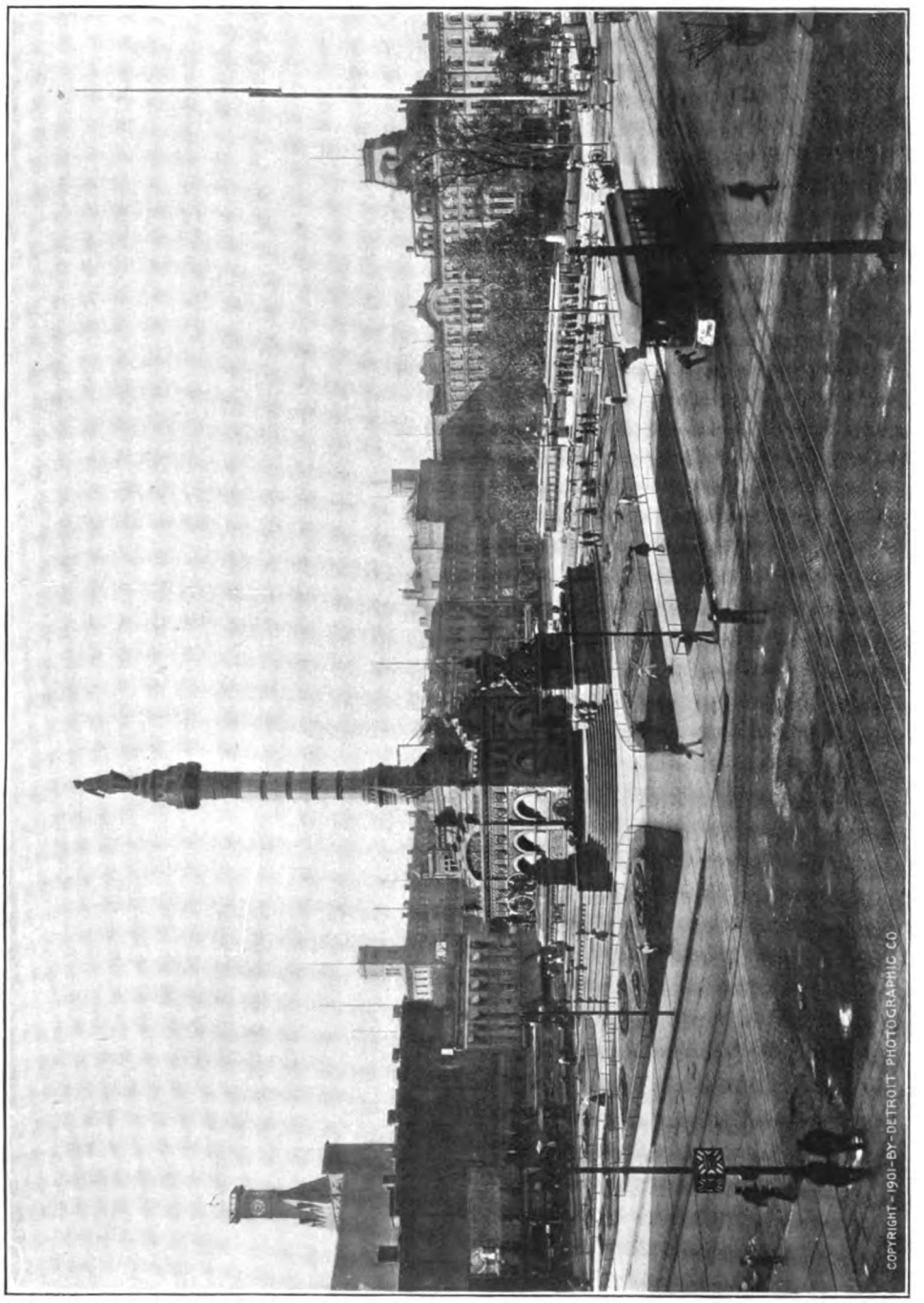
Commerce and Transportation.—The foreign commerce of the State carried on through Cleveland, Cincinnati, Toledo, and Sandusky, the four ports of entry of the United States customs districts of the region, is practically unimportant, compared with the enormous domestic commerce over the waterways and the railways of the State. The Ohio River, forming the southern boundary of the State for 436 miles, and its tributary, the Muskingum River, navigable for several miles above Zanesville, have formed for over a century one of the great highways of internal commerce, affording cheap communication with western Pennsylvania and the entire Mississippi Valley; notwithstanding the advent and competition of railroads, their waters still bear the larger freight of coal, lumber, and the heavier articles of transport. Two canals originally conected Lake Erie with the Ohio River, one from Cleveland to Portsmouth, and the other from Toledo to Cincinnati; but at the present time there is no connection with the Lake and river by either, owing to abandonment and decay. Lake Erie and the Erie Canal afford water communication with the Atlantic seaboard; and the northwest States are reached via the western Great Lakes and the Sault Sainte Marie Canal.

The construction of railroads dates from 1832 and the incorporation of the Mad River & Lake Erie railroad, now absorbed in the Big Four system. The railway mileage of the State in 1900, including main line, second line, branches, and side tracks, was over 14,000 miles. The great lines traversing the State are the Baltimore & Ohio, the Lake Shore & Michigan Southern, the Pennsylvania, the Erie, the Cleveland, Cincinnati, Chicago & Saint Louis, and the New York, Chicago & Saint Louis. The consolidation of the railroads is proceeding gradually, and nearly all the local lines together with the Lake Shore & Michigan Southern and the Baltimore & Ohio are now controlled by larger corporations. The State is provided also with a network of interurban electric railroads connecting almost every populous centre, and ranking first among the United States in the extent of its mileage.

Banks.—The first bank of the State was a private institution, which was virtually a private company to which the privilege of doing a banking business had been granted. Five banks were established before 1813, all by special act of the legislature. The first government bank in the State was established in Cincinnati in 1817. This "innovation," as it was called, met with great opposition, and various methods were suggested whereby the United States bank might be suppressed or induced to leave the State. From 1817 to 1836, there were 25 banks established. In 1836 an effort was made to establish a second United States bank, but the legislature passed a special act preventing its establishment. A number of private and unauthorized banks were established between 1840 and 1850. The failure of several of those banks caused losses to many people, and led to the passage of prohibitory laws regarding the establishment of unauthorized banks by the legislature of 1845. The law proved ineffective, and a free banking law was passed in 1851. So much had public opinion changed, that in 1863 nearly all the State banks became National banks. In the panic years of 1873, 1884, and 1893 there were many bank failures in the State, nearly all of which were confined to private and State banks. In 1900, the high prices of United States bonds and other reasons caused a reaction in favor of State banks. From 16 Nov. 1900 to 15 Nov. 1902 inclusive, there were established in the State 42 banks, savings and loan associations. During the same period there were established 20 building and loan associations. In 1903 there were in the State 371 State banks and trust companies; 320 private banks; 331 National banks; making in all 1,022 authorized banking institutions, with a total capital of $100,515,584, and with deposits amounting to $527,824,500.

Finances.—Prior to 1825, Ohio had no debt. The first State debt was contracted that year, for the construction of canals (see *History*). Later the debt was augmented for other canals, subscriptions toward railroads and roads, and in 1833 the State debt was $16,880,000, in 6 and 7 per cent bonds. The incomes from canals and a special tax were devoted to the public debt. The State credit remained unimpaired, so that when necessary it was able to borrow further sums. The years 1838–40 brought financial ruin to many enterprises throughout the Union, and made the borrowing of large sums a matter of difficulty. To have discontinued the public works would have caused great loss, so in 1843 the State issued 7 per cent bonds. The canals absorbed the school fund, the sinking fund, and the proceeds from sale of public lands, and by 1856 the debt had been reduced nearly $3,000,000. A further debt of $2,423,349 was incurred in 1856, after which the whole was gradually decreased.

In 1880 the State debt was $6,476,805. In



SOLDIERS' AND SAILORS' MONUMENT, CLEVELAND.

Mau

1903 the remaining portion of the funded debt $200,000, matured and was paid, together with $6,000 of interest money. A special university fund was created in 1892. The income of the State is derived from a general tax; about 60 per cent comes from the general property tax, and nearly 18 per cent from the excise tax. The expenses were in 1903, $8,323,267.15 which included amounts paid on funded debt and interest. The balances in the four funds, 15 Nov. 1903, were as follows:

General revenue fund	$ 2,434,654.77
Sinking fund	146,692.69
School fund	318,169.41
University fund	65,040.10
Total	$11,287,824.12

Education.— The Territory of Ohio received its first grant of land for public education in 1785; the Continental Congress reserved for school purposes the sixteenth section in every township. Later grants were made by Virginia, the Western Reserve, and certain Government Military reservations. No common school system was established until 1825; the law was passed the same day as the law providing for the construction of canals (see *Finances*). In 1827 provision was made for selling school lands. Further legislation was enacted from time to time, that of 1873 provided for the classification of school districts, and making obligatory the use of the English language in teaching all branches to be taught in the schools. The German language had been used in many schools. Prior to the establishment of the common school system, there had been founded a number of schools, some private and others by churches or communities. The Ohio University (q.v.) at Athens was founded in 1804 and the Miami University (q.v.) in Oxford in 1809. The legislature of 1901–2 passed a bill, which became a law 12 March 1902, establishing normal schools, for the training of teachers. This law provides for two schools in connection with the Ohio University at Athens and the Miami University at Oxford. These schools are known as State normal schools, they are to be supported by an income from the "Ohio and Miami University Fund," created with the bill. The income is derived from a direct tax. The legislature at the same session passed bills which classify the different grades of schools and provide for examinations for entrance to high schools. The child labor law and the compulsory education laws were rewritten and made to harmonize. Children between the ages of 8 and 14 are compelled to attend school the full time, and children between the ages of 14 and 16, not engaged in some regular employment, are also required to attend; and if the child over 14 and under 16 cannot read and write the English language he must attend the full time. Heavy penalties are provided for the violation of the compulsory education laws. The centralizing of township schools began in Ohio some years ago, when the matter was optional. The first legislation on the subject, in Ohio, was enacted in 1892. The teachers' institutes, teachers' pensions, the school curriculum, all receive wise and almost constant attention. The principal cities have city training classes for persons who intend to become teachers. In 1902 there were in the State 2,437 school districts, 66 of which were city districts, and 1,335 were township districts, of which latter there were 11,078 subdivisions. The number of children of school age was 1,245,393. The total number of children in public schools, colleges, universities, and public institutions, was 844,728; the number in Roman Catholic parish schools, academies, colleges, and institutions was 74,605, leaving 326,060 children who were in private schools in the State, in schools outside the State, or if between the ages of 16 and 21 they might be in the workshop. The Lutherans have parish schools in nearly all the large cities. In 1902 there were in the State 736 public high schools, 47 private high schools, 13 theological schools, 33 colleges and universities, and 24 professional schools including law, medicine, dentistry, and pharmacy. (The colleges and universities appear under their corporate names.)

Religion.—The Methodists (Federal census, 1900) have about one fourth of all the church members of the State; and the Presbyterians and Roman Catholics have each about one tenth. The other Protestant denominations, in membership, rank as follows: Lutheran, Baptist, Disciples of Christ, Congregationalists, and Protestant Episcopalians. The Protestants have large and well organized Sunday schools connected with all their churches. The Roman Catholics have Sunday schools also, but where the parish school has been established, the attendance at the Sunday school is usually limited to those not receiving religious instruction during the week.

Charitable and Penal Institutions.— The State Board of Charities consists of seven members; six of whom are appointed by the governor, the governor of the State is *ex-officio* a member and is president of the board. A secretary is appointed by the board. The board has the supervision of all State and municipal institutions, including infirmaries, jails and orphanages, or all institutions for furnishing relief or for correction. The State law further provides that this board shall examine, for criticism or approval, all plans for charitable or penal institutional buildings, or changes in buildings. There are 17 State institutions, as follows: State hospitals at Athens, Cleveland, Columbus, Dayton, Longview, Toledo; the Ohio Hospital for Epileptics, Institution for Deaf and Dumb; State School for the Blind, Industrial Home for Girls; Industrial School for Boys; homes at Xenia and Sandusky; a State penitentiary and a State reformatory. The municipal institutions are workhouses at Canton, Cincinnati, Cleveland, Columbus, Dayton, Toledo, Xenia, and Zanesville, and a House of Refuge at Cincinnati. The county institutions are infirmaries, homes, and jails. Outdoor relief is given by infirmary doctors, township clerks, and under the direct supervision of the Soldiers' Relief Commission. Changes will be made in the care of epileptics, who are now (1903) in a hospital at Gallipolis. The Juvenile Court, at Cleveland, has shown there are great opportunities for the prevention of the crimes often committed by the young and how they may be reclaimed. The annual State Conference has been productive of much good. Each county has a board of county visitors.

The expenses of the State institutions for the year ending 15 Nov. 1902 were $2,624,660.14; for the municipal institutions, $146,175.08; for the

county institutions, $2,126,229.03, making for the whole a total of $4,897,064.25. A National Soldiers' Home is located at Dayton. It has accommodations for 6,000 persons. The Roman Catholic charitable institutions of the State are 14 orphan asylums, having nearly 2,000 inmates; three industrial schools, 450 inmates; 19 hospitals, over 12,000 patients each year; four homes for the aged, about 500 inmates each year; three homes for the friendless, about 200 inmates each year.

Government.— The present (1904) State Constitution was adopted in 1851, and is the second one under which Ohio has been governed. (See *History.*) Provisions for a constitutional convention are arranged for in two ways. "Shall there be a constitutional convention?" is a question submitted to the people at a popular election each twentieth year, and a majority vote in the affirmative is followed by the proposed convention. A constitutional convention may be called at any time if two thirds of the members of each branch of the legislature demand it, and if a majority of all the legal votes cast at a popular election favor it. Amendments may be added as follows: The amendment may originate in either branch of the legislature; it must be approved by three fifths of the members of each House and by a majority of the electors voting at a popular election. If there are several amendments, each one must be voted upon separately. The right to vote implies citizenship, residence in the State for one year, in the county, township, or voting district such a time as may be determined by the general law for the State. Further limitations take into consideration sex, age, and sanity. The right of suffrage may be withdrawn from any person, by the legislature, for certain causes, as bribery, perjury, and other crimes. Voters are obliged to register as required by law, in cities of 9,000 population or over. The State sends to Congress 21 members. The government of the State is administered by the legislature, the executive, and the judicial departments.

Legislature.— The Senate and the House of Representatives constitute the legislature. The number of members is based upon the population and is determined by the legislature. Most of the counties have only one member in the lower house, but some of the smaller counties are united with other counties for representation. For Senatorial representation many of the counties are united; but some of the large counties are separate Senatorial districts. A county may be made a separate Senatorial district if it has the population required for a full Senatorial ratio and if a full Senatorial ratio is left in the county or district from which it asks separation. The regular sessions of the legislature are biennial, beginning on the first Monday of January each even-numbered year. The members are chosen by popular vote, for two years, the day of election being the first Tuesday after the first Monday in November. The salaries of members are fixed by law. Bills may originate in either house; each bill can contain but one subject. The lower house impeaches and the Senate tries all impeachment cases; the concurrence of two thirds of the members of the Senate is requisite for a conviction.

Executive.— The governor and his subordinates,— lieutenant-governor, secretary of State, State treasurer, and attorney-general, are elected for two years, at the general State election. The auditor is elected for four years; the board of public works and the school commissioner for three years. The governor appoints the superintendent of insurance, commissioner of railroads and telegraphs, State and law librarians, gas commissioner, and supervisor of public printing. He has the power to call extra sessions of the legislature, and the usual veto and pardoning powers. In the absence of the governor, for any cause, the lieutenant-governor, president of the Senate, or speaker of the House are in the line of succession. Ohio has had 45 governors, two of whom were governors of the Northwest Territory (q.v.).

Judicial.— The judicial power is vested in the supreme court, circuit courts, courts of common pleas, courts of probate, and justices of the peace. Other courts inferior to the supreme court may be established by the General Assembly. The General Assembly may establish courts of conciliation, and limit their duties and powers, but the judgment of such courts is not final except the parties interested agree to abide by such decision. The judges and justices are chosen by popular vote. The judges of the supreme court are chosen for a term not less than five years, the judges of the common pleas for five years, the justices of the peace for three years.

Local Government.— The legislature provides by law, for the organization and powers of cities and incorporated villages, and for the election of county and township officials. The terms of office of county officers do not exceed three years.

Laws.— The legal rate of interest is 6 per cent, but 8 per cent may be obtained by contract. Pure-food laws have been passed and are rigidly enforced. Divorces may be obtained for several causes;— wilful absence for three years, extreme cruelty, habitual drunkenness, imprisonment in the penitentiary, adultery, divorce procured by either party in another State, are the chief causes. Restrictions as to time of residence in the State are enforced.

Militia.— The number of men of militia age in 1900 was 893,327. The militia in 1903 consisted of 416 commissioned officers, 5,585 non-commissioned officers, musicians, and privates, making a total of 6,001. During the Civil War, Ohio furnished one eighth of the Federal troops.

Political Divisions.— There are 88 counties in the State. The Federal census of 1900 gave the population of the nine largest cities as follows: Cleveland, 381,768; Cincinnati, 325,902; Toledo, 131,822; Columbus, 125,560; Dayton, 85,333; Youngstown, 44,885; Akron, 42,728; Springfield, 38,253; Canton, 30,667. Columbus is the capital of the State.

History.— Numerous evidences of prehistoric Ohioan inhabitants are found in the mounds existing in different parts of the State. The study of any one of these mounds, especially of the type of the fort in Adams County, shows the degree of advancement of the people now called the Moundbuilders (q.v.). The first appearance of Ohio in history is when Robert Cavalier de LaSalle left his home at LaChine, near Montreal, Canada, in 1669, on a journey of adventure, before his return he discovered the Ohio River and ascended on its waters near

where Louisville now stands. When LaSalle later vested in France the title of the Mississippi Valley by discovery in 1682, the area of what is now known as Ohio became a French possession and remained such until the Treaty of Paris in 1763 when it became territory of Great Britain.

The first English-speaking settlement made in Ohio was established at the mouth of Laramie's Creek on the Great Miami River in what is now Shelby County. This settlement was made in 1749 and was called Pickawillany. In June, 1752, the French, with their Indian allies, the Chippewas and Ottawas, massacred these white settlers and wiped out the first English settlement in what is now Ohio. In 1748 some English and Virginian gentlemen organized what was known as the "Ohio Land Company," for the purpose of settling the newly discovered Ohio Valley. Their settlements aroused the intense antagonism and jealousy of the French, and the result was an attempt on the part of the French to stop these intrusions into her territory, and England to persist in continuing them. In 1753 The Ohio Company complained to Governor Dinwiddie of the interference by the French authorities, and the governor sent George Washington, a young man of 23, to endeavor to terminate the friction by peaceable negotiations. He was unsuccessful, however, and the conflict continued until finally peace came from the treaty of Paris, signed 18 Feb. 1763, by the terms of which the vast territory of which Ohio was a part became the possession of Great Britain. After ten years of peace came from the treaty of Paris, signed 18 the attention of the colonial authorities, and in 1774 a campaign against the Indians was inaugurated by Governor Dunmore of Virginia, which is known in history as Lord Dunmore's war. It was in this campaign, in the heart of the Indian country along the Scioto River, that the celebrated speech of Logan, the Mingo chief, was delivered.

When the war for independence came on, the Continental Congress, regarding the Northwest Territory as a good heritage to preserve for American supremacy, fortified various points in what is now known as Ohio, the earliest of which was Fort Laurens, the first military stockade erected by American authority in Ohio. This fort was abandoned in 1779. In 1780 and the five years following, Ohio was the theatre of active warfare against the Indians and under the leadership of Col. John Beauman, of Kentucky, the Indians were attacked on the Little Miami River in what is now Greene County, and by Col. George Rogers Clark at other points contiguous. In this period occurred various scenes indicative of the terrible condition of feeling existing between the Indians and whites. There were massacres on both sides characterized by brutality and savagery. The year 1782 opened with a number of atrocious deeds of violence by the Indians. Innocent women and children were murdered in the most horrible manner. The whites were exasperated, and in February of this year Col. Williamson led an expedition against the Indians. They marched into the Tuscarawas country in eastern central Ohio and massacred in cold blood and with brutal vengeance the Moravian Indians, a peaceable and Christian tribe that had never raised their hands against the whites nor participated in any of the troubles between the Americans and English. Later in May of the same year Col. Wm. Crawford marched 500 men through the Ohio country from where Steubenville now stands to the Wyandot country on the Sandusky River, near where Upper Sandusky is now located. His attack resulted in defeat with a loss of over 100 of his men and the capture of Col. Crawford himself. Col. Crawford was burned at the stake by the Delaware Indians in retaliation for the murder of some of their tribe by Col. Williamson's men.

These Indian campaigns and wars, up to 1782, while they were the outgrowth of adventure upon the part of the Pennsylvanians and Virginians, were sanctioned by the Continental Congress and by the various colonial governments.

When peace came through the treaty of Paris, which was signed 3 Sept. 1783, all the territory east of the Mississippi River was relinquished to the United States by Great Britain. A part of this acquisition was what was known as the Northwest Territory (q.v.), which added 240,000 square miles to the United States. In October 1787 the Federal Government sent 700 troops to the frontier to protect this territory and to emphasize to the Indians that the white man's government had commenced. On 5 October Congress elected officers for the new government. Arthur Saint Clair was named as governor and with him were designated James M. Varnum, Samuel Holden Parsons and John Armstrong, as judges and Winthrop Sargent as secretary of the territory. Mr. Armstrong declined to serve as judge and John Cleve Symmes was named to fill the vacancy. On 9 July 1768, Governor Saint Clair and his associate officers arrived at Fort Harmer where they remained until the 15th when they entered Marietta as the representatives of the National Government.

The first settlement in the Northwest Territory was effected under the control and direction of Gen. Rufus Putnam, who had formed "The Ohio Company of Associates" (q.v.) in Boston on 1 March 1786. Gen. Putnam with his little band of emigrants journeyed from Connecticut to the banks of the Ohio in the winter of 1787–8, and on 7 April they landed in the rain at the mouth of the Muskingum River and founded Marietta (q.v.).

Governor Saint Clair, as before stated, inaugurated the reign of law, and on 2 September the first court ever held on Ohio territory was opened with formal ceremonies at Marietta. The second settlement in Ohio was made at Columbia, about five miles above Cincinnati. Major Benj. Stites of Pennsylvania purchased 10,000 acres from Judge Symmes near the mouth of the Little Miami. On 18 Nov. 1788, 26 hardy Pennsylvanians located at this point, erected a block house, laid off a little town and called it Columbia. While the major was laying off the town of Columbia, Mathias Denman, with Robert Patterson and Israel Ludlow laid off a town on the high north bank of the Ohio River and opposite the mouth of the Licking River. About 28 Dec. 1788, Denman and his companions, 15 in number, landed at this site and founded the city of Cincinnati (q.v.).

In February, 1789, North Bend, near the Indiana line, was settled by Judge Symmes and his associates. For the protection of the three

settlements at Cincinnati, Columbia and North Bend, Fort Washington was constructed at Cincinnati which was then the principal centre of the Miami country. On 2 Jan. 1790, Governor Saint Clair arived at Fort Washington and issued his proclamation establishing Hamilton County. The county-seat was fixed at Cincinnati. This was the beginning of the great State of Ohio. It absorbed the population of North Bend and Columbia, and 1795 its population was soldiers.

The next settlement in point of time was at Gallipolis. October 1790, 400 French emigrants settled at this place and in memory of their native land called it Gallipolis. They were induced to make settlement here by the picturesque and highly colored representations made to the French people by Joel Barlow who went to France in 1788 to represent the Scioto Company (q.v.), for the purpose of putting its lands upon the market. The settlers were unqualified and unfitted for the hardship of pioneer life, and this fact, in addition to the one that the title to the lands was defective, broke up the settlement. Many of them drifted further west to Detroit and Kaskaskia, and some remained and purchased their land from the Ohio Company. Congress, in 1795, sympathetically granted 24,000 acres of land to these defrauded emigrants. This land is in the eastern part of Scioto County on the Ohio River and is known, by reason of its history, as the "French Grant."

At Manchester, on the Ohio River, in 1791, Col. Nathaniel Massie made the first settlement in the Virginia Military District. This composed the territory between the Scioto and Little Miami which had been reserved in the deed of cession by Virginia for bounty land for her soldiers.

In 1796 Col. Massie, assisted by Duncan McArthur, laid out and founded the town of Chillicothe. The opening to emigration of the far-famed land of the Shawnees attracted many settlers from Virginia, and Chillicothe in a short time became an important and populous town.

The settlements referred to thus far were in the southern and central portions of the State, and it was not until 1796 that emigration commenced to develop in the northern part. Gen. Moses Cleaveland, as agent for the Connecticut Land Company, with 52 Connecticut settlers, on 4 July 1796, landed at the mouth of Conneaut Creek, in Ashtabula County, for the purpose of settling the Western Reserve. In addition to being settlers, many of them were surveyors. On 26 July 1796, Cleaveland and his associates proceeded to the mouth of the Cuyahoga River and laid out the chief settlement of the Western Reserve. It was named Cleveland, in honor of the leader of the expedition.

The pioneers of the Western Reserve that settled at these points suffered many privations and the country did not grow as rapidly as those further south, and in 1788 there were but 130 persons in the whole Reserve.

Ohio now commenced to grow with considerable rapidity and settlements sprung up and developed in every quarter. In 1799 there were in existence and enjoying peace and prosperity the towns of Marietta, Columbia, Cincinnati, North Bend, Gallipolis, Manchester, Hamilton, Dayton, Franklin, Chillicothe, Cleveland, Franklinton, Steubenville, Williamsburg, and Zanesville. Their prosperity and safety was accomplished through much tribulation and danger, for during the period of their development the territory had passed through its second war with the Indians, to which a retrospect is necessary.

Notwithstanding that on 9 Jan. 1789, at Fort Harmer, Governor Saint Clair made a treaty with the Six Nations and the Representatives of the Wyandots, Delawares, Chippewas, Ottawas, Pottawatomies and Sacs, he failed to secure the good-will of the Indians. Marauding parties and forays on the part of the savages continued to be projected against the whites, evidently instigated by the English. Accordingly, in September 1790, Saint Clair, with a little army, gathered from Pennsylvania, Virginia and Kentucky, amounting to about 1,400, of which 300 were regulars, marched against the Indians. He was overwhelmingly defeated. Owing to a failure to control the militia and lack of general discipline the battle resulted in a rout. After the defeat of Saint Clair, General Anthony Wayne, one of the most daring officers of the Revolution, was placed in charge of a campaign against the Indians and spent the spring and summer of 1793 at Fort Washington in Cincinnati, drilling and recruiting his men. In October 1793 he left Fort Washington with an army of 3,000 well-equipped soldiers and proceeded to six miles beyond Fort Jefferson, where he erected Fort Greenville, near where Greenville, Darke County, is now situated. He spent the entire season here and in the spring of 1794, after making many efforts to enter into a treaty of peace, he attacked them on 20 August, defeating them with great slaughter. Nine of the Wyandot chiefs were killed and the Indian question was solved forever in Ohio. This engagement was known as the battle of Fallen Timbers, on account of the breastworks of fallen trees behind which the Indians were massed. The result of this campaign was a treaty of peace which was known as the Treaty of Greenville, which was signed by the chiefs of the 12 hostile tribes at Fort Greenville, 3 Aug. 1795. By the terms of this treaty the Indians released extensive territory between the Lakes and the Ohio River and the United States gave them $20,000 in merchandise and $9,000 annually, to be divided among the several tribes. This was the last Indian warfare in Ohio.

With peace the population of the territory began to increase. In 1790 there were about 3,000 white inhabitants in Ohio; five years later there were 15,000 white persons in the Northwest Territory, and by 1798 there were 5,000 free male persons of full age within its boundaries, and under the Ordinance of 1787 this entitled the people to a territorial legislature. Accordingly on 29 Oct. 1798, Governor Saint Clair issued his proclamation fixing the day for electing territorial representatives on the third Monday of December following. Thus the Territory of the Northwest passed into its second or legislative grade of government.

During the years preceding this change, barring the Indian troubles, the settlers were progressing satisfactorily. Religion and literature were planted in Ohio. The first church in the territory was erected in 1790 at Columbia, and on 9 Nov. 1793 the first newspaper was printed by William Maxwell of Cincinnati, under the

name of 'The Sentinel of the Northwest Territory.'

The first territorial legislature met at Cincinnati 4 Feb. 1799. Edward Tiffin of Ross County was elected Speaker of the first General Assembly of the Northwest Territory, and Henry Vanderburgh President of the Council. William Henry Harrison, afterward President of the United States, was elected the first delegate to Congress from the territory. A bitter conflict between the governor and the legislature commenced at this time. Saint Clair was a Federalist and he was opposed by the followers of Mr. Jefferson in the territory. At this time the vast Territory of the Northwest was divided into two districts — the dividing line ran from the mouth of the Kentucky River to Fort Recovery, and northwest to the boundary line between Canada and the United States. West of this line was erected the Territory of Indiana, of which Mr. Harrison was appointed governor, and east of the line was the Territory of the Northwest, of which Chillicothe was designated the seat of government. On 19 Dec. 1799, Governor Saint Clair, exercising the power vested in him by the Ordinance of 1787, dissolved the territorial legislature and fixed the first Monday in November 1800, as the date of its next session.

The second session of the territorial legislature met at Chillicothe on 3 November, and after being in session five weeks adjourned on 9 December. William Henry Harrison having resigned his position in Congress, William McMillan of Cincinnati was elected to fill the vacancy and Paul Fearing of Marietta to serve the succeeding term. At this time Ohio had a population of 42,000. Transportation and trade were increasing on all hands. On the Ohio River there were packets running regularly for mail and traffic between Cincinnati and Pittsburg, making the round trip in about four weeks. The first vessel of any size or importance was the brig Saint Clair, built at Marietta, of 110 tons burden. It was loaded with provisions, sailing down the Ohio, Mississippi and across the Gulf of Mexico and finally landed safely in Philadelphia. Transportation by land was by the heavy and cumbrous trading wagons drawn by four and six horses. Cincinnati was a great distributing point for the southern and central part of the territory.

The iron used in the territory came from Pittsburg and Baltimore, and when from the latter cost $200 a ton for transportation to the interior of Ohio. The southern and central parts got their supply of salt from the "Ohio Salt Works," located in what is Jackson County of to-day. It sold at the works for two and three dollars a barrel, and after the journey homeward of 100 miles the purchaser sold it to his neighbors for seven dollars a barrel. These were some of the general conditions of the people in what is now Ohio in 1800. There were no vehicles except for burden in the territory. Marietta was the stronghold of Federalism and Chillicothe was the seat of Republicanism, and there were bitter conflicts between the followers of Alexander Hamilton and Thomas Jefferson. Cincinnati was divided almost equally in politics.

The third territorial legislature commenced on 24 Nov. 1801. At this session Cincinnati and Chillicothe were incorporated and the seat of government changed from the latter town to the former.

On 3 April 1802, Congress passed an act enabling the people of Ohio to form a constitution and State government. This was the result of a persistent controversy between the followers of Jefferson and the Federalists. In pursuance to that law of Congress the constitutional convention met at Chillicothe 1 Nov. 1802 and adopted a constitution for the State. It was never submitted to the people. The intense feeling against Saint Clair on account of his vetoes eliminated the veto power from the governor. The convention fixed the capital at Chillicothe until 1808, and named the boundaries of the State. On 19 Feb. 1803, Congress of the United States extended the jurisdiction of the Federal courts over Ohio.

On the second Tuesday of January 1803, the election for governor was held. Edward Tiffin, the candidate of the anti-Federalists, was elected. On Tuesday, 1 March 1803, the first legislature met at the State capitol at Chillicothe. Nathaniel Massie was elected Speaker of the Senate and Michael Baldwin Speaker of the House. Officers provided under the constitution were appointed as follows: Secretary, William Creighton, Jr.; Auditor of State, Thomas Gibson; Treasurer of State, William McFarland; Judges of the Supreme Court, Return J. Meigs, Jr., Samuel Huntington, and William Spriggs. At this session Thomas Worthington and John Smith were elected United States Senators from Ohio.

In 1805 Aaron Burr (q.v.), the ex-Vice-President, visited the west and spent considerable time in Ohio, accumulating boats, provisions and accoutrements for the carrying out of his treasonable designs, which were frustrated through the activity of Governor Tiffin. For this act Tiffin received the thanks of the President of the United States. On the ground of being suspected as an accomplice of Burr, John Smith, one of the senators from Ohio to the United States Senate, was charged with treason, and after a complete investigation by the Senate a motion was made to expel him, 9 April 1808, but failed for want of the requisite two thirds vote. He resigned, however, at the request of the General Assembly of Ohio, and Return J. Meigs, Jr., was elected in his stead.

The first seven years of Ohio's estate was a period of marvelous advancement. The population in 1810 was 230,760, an increase of more than 400 per cent over that of 1800. The immigration was healthy and valuable. New New counties were erected and out of the wilderness came wealth, so that in 1810 the taxable property of Ohio was valued at $25,000,000. The natural resources of the State became known and developed. The first blast-furnace was operated in Mahoning County; coal was first mined in 1810 in Summit County.

Education advanced materially (see paragraph on Education). By 1810 there were fourteen newspapers in Ohio, representing the two contending parties of the day. The populations of the towns throughout Ohio continued to increase. Cincinnati ranked first in importance and in size. Its population had increased to 2,540. On the whole, Ohio was occupying a positive and prominent position in the Union.

The first steamboat to navigate the Ohio

River was launched at Pittsburg and called the New Orleans. It descended to Louisville and continued to make trips between that place and Cincinnati. With this event began a new era in the business development of the Ohio, and the value of the Ohio River as a channel of transportation became more apparent than ever to the people of the new State. In 1810 as a result of political feeling in the legislature, the seat of government was transferred from Chillicothe to Zanesville.

On 14 Feb. 1812, the legislature changed the seat of government from Zanesville to Chillicothe, but at the same time provided for the permanent establishment of the capital at Columbus.

In the second war with England, which was finally declared by the United States 18 June 1812, Ohio played an important and patriotic part. She furnished regiments to Gen. Hull at Detroit and resented his cowardly surrender. Under Gen. William Henry Harrison the soldiers of Ohio were chief in his movements in the northwest in the war against England. Governor Meigs in the meantime calling out, as necessity required, the quota of men assessed upon Ohio. At Fort Meigs, at Fort Stephenson and at other points throughout the State there were conflicts with the British, and at Lake Erie, through Oliver H. Perry, a young sea-captain from Rhode Island, the English supremacy upon the northern lakes and upon the line of the northwestern boundary was destroyed forever. The battle of Lake Erie was the last engagement of the War of 1812 that occurred within the territorial limits of Ohio. To the expense of this war Ohio contributed over $300,000. Governor Meigs, on account of his patriotic services to the country, was made postmaster-general in President Madison's cabinet.

The General Assembly met for the first time in Columbus on 2 Dec. 1816, and it has assembled there ever since. In this year the State Library was founded by Governor Worthington and from a few volumes gathered by him it has grown to be a fine collection of more than 100,000 volumes.

The second United States bank, when rechartered in 1816, opened branches in Ohio at Cincinnati and Chillicothe. This was the occasion for a long and severe contest between the officials of the State of Ohio and the United States government over the right of the former to tax branches of the United States Bank. The General Assembly passed a law taxing each bank $50,000 and authorized the State government to collect it by force. After a long litigation it was ended in 1824 by the Supreme Court of the United States declaring the Ohio law taxing banks unconstitutional. The controversy was carried on largely by the advocates of the State banks on one hand and the opponents on the other.

In 1825 the State of Ohio commenced the construction of her canal system. The work was formally commenced 4 July 1825. Governor DeWitt Clinton of New York and Governor Jeremiah Morrow of Ohio initiated the labor of breaking the ground. After ten years all that energy, men and money could do was directed to the canals. The Federal government aided and encouraged the construction by the donation of 1,100,351 acres of land. This land was sold and the proceeds, about $2,200,000, were used for the construction of the canals. At the same time of the inauguration of the canal system the public school system was developed. By the association of the friends of internal improvement and popular education both of the great movements were accomplished.

Lafayette visited Ohio in 1825 and was made the formal guest of the State for days, amid the thundering of cannon and the acclamation of a grateful people.

Commencing in 1831 Mormonism flourished several years in Ohio. Joseph Smith with his followers settled in Kirtland, Lake County, in 1832. They built a building here in 1835 which was dedicated on 27 March 1837, in a ceremony witnessed by thousands of people. The Mormon Church grew in numbers, wealth and power for five years in this State; but it finally, under the condemnation of public opinion and the enforcement of the law, crumbled away until its leaders and people, in 1838, fled from the State to beyond the Missouri River.

What is known in Ohio history as the «Toledo War,» culminated in 1835. It was a dispute between Ohio and Michigan over the boundary line between these two States. There was involved in this controversy a strip of land the whole length of the northern Ohio boundary, five miles in width at the west end and over eight miles at the east end. It was rich agricultural land, but its chief charm was the harbor where Toledo now stands. Both sides, through their governor and legislative bodies, asserted their respective jurisdictions over the mooted territory. So strong was the determination of each State to secure possession of the strip of territory which each claimed that the militia of both States were called out for a time and conflict was imminent. On 31 March Governor Lucas with his staff and 600 of the militia of Ohio appeared at the debated boundary line. In the meantime Governor Mason, with 1,000 men, arrived at Toledo, and there encamped fully determined to assert the jurisdiction of Michigan. In the meantime, however, two peace commissioners from the President of the United States arrived on the scene. The dispute was finally terminated on 29 Aug. 1835, by the removal of Governor Mason from his position as governor of the territory of Michigan. Congress, at its next session in June 1836, decided in favor of Ohio. As compensation for the loss of this fertile strip of land Michigan was given the large and fertile peninsula between Lakes Huron, Michigan and Superior. Ohio thus settled her northern boundary and Michigan was given one of the richest beds of mineral ore in the world.

On 4 July 1839, the cornerstone of the present State house was laid in the presence of many citizens. The occasion was made one of public display and demonstration. Ex-Governor Jeremiah Morrow delivered the address and laid the cornerstone.

The census of 1840 found Ohio the third State in point of population, having 1,519,467 inhabitants; being an increase of 63 per cent over the population of 1830. At this time nearly one third of the population was employed in manufacture and trade. Cities, while increasing in number, were still small in size. Cincinnati had 46,338 inhabitants; while Cleveland was a town of 6,000 and Columbus the same. In this

decade the railroad system of Ohio was commenced.

In common with the rest of the country, Ohio was much agitated by the nomination and election to the presidency of Gen. William Henry Harrison in 1840. This was the first impression in a political way that Ohio made upon the country. Up to this time the State had but little influence at Washington. But the nomination of her citizen, General Harrison, at once made Ohio the battlefield of the contest. Great meetings, never equaled up to this time, were frequent in the State. General Harrison's march through Ohio was one triumphal procession of oratory, display and song. At Dayton a political meeting, addressed by General Harrison, numbered 80,000. At Chillicothe he spoke to 50,000 people. Political meetings at this time lasted for several days, just according to the number of orators. The "Log Cabin" campaign resulted not only in the election of General William Henry Harrison to be President of the United States, but also Hon. Thos. Corwin was elected governor of Ohio.

In 1846 Ohio was again called to play an important part in the military affairs of the Union. War with Mexico was declared 13 May 1846, and Ohio sent out four regiments of volunteers and three independent companies. The total number of men furnished was 5,536; more than any other northern State.

In August 1846 the introduction of raw coal as furnace fuel in lieu of charcoal, for iron-smelting, was an industrial event the effect of which on the wealth and growth of the State cannot be justly estimated. It gave a fresh impetus to iron manufacturing and allayed the painful doubt about its reliability, raised by the diminution of the timber supply for the charcoal blast furnaces.

In February 1850, an act calling a second constitutional convention was passed. Nearly 50 years had passed since the forming of the first constitution and in the stupendous development of the State it was generally admitted that the instrument needed change and revision. After a session of 135 days the convention adjourned, and on the third Tuesday of June 1851, the constitution was submitted to the people and it was adopted by a pronounced majority.

The last vestige of what is known as the "black laws," that is, laws that discriminated against the negro in Ohio by preventing him being a witness in court if a white man was party to the case, and by preventing his settlement in Ohio without giving bond and by imposing other restrictions, both unjust and unjustifiable, were repealed in 1849. Anti-slavery sentiment was strong in Ohio and the legislature of this period was known as the "anti-slavery legislature." Out of the public discussion of those days grew the Republican party, which held its first State convention in the State of Ohio in Columbus, 13 July 1855. In the election which followed Salmon P. Chase was elected governor, and on 14 Jan. 1856 commenced his gubernatorial term. Governor Chase's administration was signalized by the reorganization of the militia of the State. During this period the State was noted for its "Underground Railroad" (q.v.).

With the approach of the Civil War and in that crisis Ohio met every patriotic demand made upon her. When President Lincoln issued a proclamation, 15 April 1861, calling for 75,000 of the militia of the several States of the United States, the response was immediate from Ohio. Within 24 hours after the President's call 20 companies had proffered their services. Within 36 hours they were on their way to Columbus, where they were organized, 18 April, into the First and Second regiments of Ohio volunteers. The next day they started for Washington city. All this preparation was actively sustained by the legislature. On the day after the call to arms the Senate passed a million-dollar appropriation bill for war purposes exclusively. Within three days it passed the House unanimously. The late President Garfield was at that time a member of the Ohio Senate and took advanced ground in sustaining the Federal government. In the summer of 1863 the State of Ohio was subjected to the attacks of Gen. John Morgan, a daring Confederate raider, who entered the southern part of the State near Cincinnati and passed through southern Ohio; but after inflicting considerable damage, was eventually captured at Salineville, Ohio, 26 July 1863. Morgan's raid cost the people of Ohio $897,000.

The history of Ohio in these later days has been one of unbroken progress and prosperity. No stirring events have entered into her records save the marvelous developments of her people.

For the third time, 14 May 1873, a constitutional convention assembled to prepare and present to the citizens of Ohio a new organic instrument of law; but they were satisfied with the constitution of 1851 and they rejected, on 18 Aug. 1874, the proposed constitution by a majority against it of 147,284.

Of the Presidents since 1876 four, Rutherford B. Hayes, James A. Garfield, William McKinley and Benjamin Harrison were native Ohioans.

In the growth of population of Ohio she maintained her position as third State in the Union for 50 years, from 1840 to 1890; when she became the fourth in rank, having been outgrown by Illinois; but, notwithstanding, the percentage of increase for as old a State has been marvelous. From 1820 to 1850 the development of population was over 700 per cent, and it was more than doubled from 1850 to 1900. The population during the last three decades was (1880) 3,198,062; (1890) 3,672,316; (1900) 4,157,545.

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Ohio, one of the largest tributaries of the Mississippi River. It is formed by the junction of the Allegheny (q.v.) and Monongahela (q.v.) rivers, at Pittsburg, in the western part of Pennsylvania. The Allegheny River brings to the Ohio the waters of Chautauqua Lake, and the drainage waters from the southwestern part of the State of New York. The headwaters of the Allegheny in New York are only a few miles from Lake Erie. It is navigable 120 miles from the Ohio. The headwaters of the Monongahela have their rise in the Alleghany Mountains in West Virginia, near the source of the Potomac River. It is navigable for about 60 miles from the Ohio. The Allegheny and Monongahela are large rivers at Pittsburg, where they blend their waters to make the new stream. Here the Ohio is 1,021 feet above sea-level, and at its confluence with the Mississippi it is 322 feet above the sea. At first the Ohio flows north by west, the valley broadening out to a flood plain. At Beaver the river turns and flows south by west, then almost south, forming the boundary between Ohio and West Virginia; changing its course west, northwest, southwest, forming the boundary between Ohio and Kentucky, then forming the boundary between Kentucky on the south and Indiana and Illinois on the north. Along its course are a number of large curves, but it has no falls nor rapids that obstruct navigation except at Louisville (q.v.), where a coral reef is found, but the rapids formed have been overcome by lateral canals. The descent here is about 22 feet in two miles. The river is now navigable for its whole course, a distance about 975 miles; but a direct line from Pittsburg to the mouth of the river is about 614 miles. The area of the Ohio basin is about 214,000 square miles. The average rate of flow is a little over three miles an hour. The chief tributaries are the Muskingum, Scioto, and Miami in Ohio, and the Wabash, which is the largest affluent from the north. The largest tributaries from the south are the Tennessee and the Cumberland; other large streams are the Kanawha, Licking, and Kentucky. The largest tributaries of the Ohio have their headwaters in the mountains, and thus they become the depositories of vast quantities of the melted snows and heavy rains of spring which cause floods in the Ohio Valley. Often great damage to property and even loss of life is caused by these floods. There are times in the dry season when the water is so low at Pittsburg and in places below, even as far as Cincinnati, that navigation is hindered or retarded. The Ohio and its tributaries have 2,300 miles of navigable waters. The coal from Pennsylvania, West Virginia, and Ohio, the building stone, and the grain and other farm products, the iron, steel, clay, and lumber products, make a large amount of freight which is carried over the Ohio and its tributaries. The average annual amount of freight is 15,000,000 tons. There are a number of large cities on the banks of the Ohio, some of which are Cincinnati, Louisville, and Evansville.

The Ohio River has been prominent in the history of the United States. From the first it was recognized as one of the important waterways of the country. The short portages from Lake Erie to the navigable tributaries of the Ohio, and the continuous waterway to the Gulf of Mexico, made the river an important route for the explorer, missionary, and settler. See UNITED STATES, *History;* NORTHWEST TERRITORY; OHIO. Consult: Bliss, 'Dr. Saugrain's Relation of his Voyage Down the Ohio River,' in 'American Antiquarian Society Proceedings' (Worcester, 1897); King, 'History of Ohio.'

Ohio, Army of the, in American military history, a division of the Federal army in the Civil War; organized in 1861–2 by General Buell; afterward under the command of General Rosecrans and incorporated with the Army of the Cumberland. A second department of the Ohio was formed, and was also in 1865 incorporated in the Army of the Cumberland.

Ohio Company, The, in American history, a western colonial enterprise known as the Ohio Company the first and Ohio Company the second. (1) In 1749 George II. granted to a party of wealthy Virginians a tract of land containing 500,000 acres, lying mostly to the west of the mountains and south of the Ohio River. Thomas Lee was the projector of this company, but it was later conducted by Lawrence Washington. The conditions of the grant were that 100 families should be established there and a garrison maintained. It was short-lived. (2) On 3 March 1786 at the suggestion and in the house of Rufus Putnam (q.v.), of Rutland, Mass., Putnam, Cutler, Brooks, Sargent and Cushing organized an association of 1,000 shares, each of $1,000 in Continental certificates, or $125 in gold. A year was allowed for subscription. Land was to be purchased from Congress, in tracts lying between the Ohio and Lake Erie. On 9 May 1787 Parsons, agent for the company, appeared before Congress and was well received. Congress granted certain lots free of charge, and an enormous tract was bought at about eight or nine cents per acre in specie. Colonization was immediately begun, and slavery was prohibited. The company had much influence in shaping the ordinance for the government of the Northwest Territory. See ORDINANCE OF 1787.

Ohio State Archæological and Historical Society was first organized at Mansfield, Ohio, in 1875 as the Archæological Society of Ohio. Subsequently it was reorganized at Columbus and incorporated March 1885 as the Ohio State Archæological and Historical Society. Its first president was Hon. Allen G. Thurman. E. O. Randall of Columbus has been its secretary since 1893. The headquarters are at Columbus. It has a library and very extensive archæological museum in Page Hall, Ohio State University. It is managed by a board of trustees, part of whom are appointed by the governor and part elected by the members of the society at their annual election. The society is supported with appropriations by the General Assembly of the State. It publishes an annual volume of biographical, historical and archæological matter pertaining to Ohio. It has published some fourteen volumes. It conducts archæological researches each summer amid the sites and remains of the prehistoric mound builders. Prof. W. C. Mills is the curator. It has some 300 members, divided into three classes, namely, honorary, life and ordinary.

Ohio State University, opened at Columbus in 1873. In 1866 an act passed the Ohio legislature providing for the establishment of the Ohio Agricultural and Mechanical College, in accordance with the provisions of the Federal

land grant of 1862. But nothing further was done until 1870, when a second law was passed by which the college was established at Columbus. It was reorganized in 1878 and the name changed to Ohio State University. The present organization includes six colleges: (1) the College of Agriculture and Domestic Science, offering courses in agriculture, horticulture and forestry, and domestic science; (2) the College of Arts, Philosophy and Science, which confers the three degrees, A.B., B.S., and Ph.B.; (3) the College of Engineering, offering courses in civil, mining, mechanical, and electrical engineering, ceramics, industrial arts, chemistry and architecture; (4) the College of Law; (5) the College of Pharmacy; and (6) the College of Veterinary Medicine. The work is arranged for the group system of electives. There are also shorter courses offered in agriculture, dairying, domestic science, mining, clay working and ceramics, and industrial arts; and provision for graduate work. The instruction in agriculture, engineering, and science has always been a prominent feature of the university's work; and its laboratories, and museums of geology, agriculture, mechanics, and metallurgy are especially well equipped. A lake laboratory for biological study is maintained at Sandusky. Military drill is a part of the curriculum for men. Women are admitted to all the departments. The governing body is a Board of Trustees, appointed by the governor with the approval of the State senate for seven years. The campus contains 345 acres, of which 235 are set apart for the work in agriculture and horticulture. The income is derived from the land grant of 1862, from the annual Federal appropriation, and from a permanent annual grant from the State, established in 1891, and doubled in 1896. In 1903 the total income was $420,000; the students numbered 1,516, and the faculty 136.

Ohio University, a State institution at Athens, Ohio, opened in 1809. The present organization includes the collegiate department, a school of music, a school of commerce (business course), a normal and a preparatory department; post-graduate work is also provided for. The three bachelor degrees of A.B., B.S., and Ph.B. are conferred, and the corresponding master's degrees. The university was founded in accordance with a provision in the terms of purchase made by the Ohio Company of Associates with the United States government and by the same provision was endowed with two townships of land; it also receives a State appropriation annually; in 1903 the income amounted to $61,236; the library contained 17,000 volumes; the students numbered 419, and the faculty 39.

Ohio Wesleyan University, founded at Delaware, Ohio, in 1844, under the auspices of the Methodist Episcopal Church. The Ohio Wesleyan Female College was united with the university. Besides the collegiate department, there are schools of music, and of fine arts, a commercial department, a preparatory department, and a school of medicine. The bachelor's degrees conferred are bachelor of arts, bachelor of science and bachelor of letters. The school of medicine is located at Cleveland, and was formerly an independent school (founded in 1863), and was united with the university in 1896 under the title of the Cleveland College of Physicians and Surgeons of Ohio Wesleyan University. Women are admitted to all departments. The grounds and buildings in 1903 were valued at $743,000; the library contained 50,000 volumes; the productive funds amounted to $530,460. In the same year the students numbered 1,550, the faculty 75; the total number of graduates was 25,000, many of whom have entered the ministry.

Ohm, ōm, **Georg Simon,** German physicist: b. Erlangen 16 March 1787; d. Munich 7 July 1854. He was educated at the University of Erlangen. In 1817 he became a teacher at the gymnasium in Cologne, and in 1826 at Berlin; from 1833 to 1849 he was director of the polytechnic school at Nuremberg, and in 1849 went to Munich as professor of physics at the university. His researches were chiefly concerned with galvanic currents, and he formulated the law which is known as Ohm's law; that, the current is directly proportional to the electromotive force and inversely proportional to the resistance. This law was first stated in his 'Bestimmung des Gesetzes, nach welchem die Metalle die Kontaktelektrizität leiten' (1826), and was further developed and proved in his 'Die galvanische Kette mathematisch bearbeitet' (1827); in English 'The Galvanic Chain Mathematically Worked Out' (1841). He also wrote 'Beiträge zur Molekularphysik' (1849), and 'Grandzüge der Physik' (1854); his collected writings were published by Lommel in 1892. His name was given to the practical unit of electrical resistance in 1881. Consult Mann, 'Georg Simon Ohm' (1892).

Ohm, the practical unit of electrical resistance, adopted in 1881 by the International Congress of Electricians at Paris, the centimetre-gram-second unit formerly in use having proved too minute for convenient reckoning. The ohm, named after the German physicist Ohm (q.v.), equals 1,000,000,000 (10^9) C. G. S. electro-magnetic units of resistance; a microhm is a resistance of one millionth $\frac{1}{10^6}$ of the ohm; and the megohm is a measure 1,000,000 (10^6) times the ohm. The ohm may be independently defined as the electrical resistance to an unvarying current offered by a uniform column of mercury at 0° C., 106.3 centimetres in length, with a mass of 14.4521 grams.

Ohm's Law, a fundamental principle in the mathematical theory of electricity, discovered in the early part of the 19th century by Dr. Georg Simon Ohm, a professor of physics at Cologne. It was first published in 1826. The law may be stated in the following manner: In any closed electrical circuit of resistance R, the current C, produced by an electromotive force E acting around the circuit, is given by the formula $C = E/R$; C being measured in amperes, E in volts, and R in ohms. Some authorities regard this simple equation as a sort of truism, pointing out that the ampere is, by definition, the current generated by one volt in a circuit whose resistance is one ohm. Ohm's law is much more than a truism, however, because it states not only that one volt generates a current of one ampere in a circuit whose resistance is one ohm, but also that P volts, acting in a circuit whose resistance is Q ohms, generate a current of P/Q amperes. Ohm's law was first given for the case in which a constant electromotive force

acts in a simple linear circuit, but it may readily be generalized so as to apply to branched circuits and to circuits in which the electromotive force is variable. See ELECTRICITY; RESISTANCE; UNITS.

Oh'mann-Dumas'nil, Amant Henry, American dermatologist. b. Dubuque, Iowa, 30 Sept. 1857. He was graduated from the Missouri State University in 1877, and from the Saint Louis Medical College in 1880, and has since made dermatology his specialty. He is editor and proprietor of the Saint Louis 'Medical and Surgical Journal,' and has published 'Hand Book of Dermatology' (1898); 'History of Syphilis' (3 vols. 1899).

Ohnet, Georges, zhŏrzh ō-nā, French novelist and dramatist: b. Paris, France, 3 April 1848. He was educated for the law but abandoned it for journalism, and in 1875 made his first success as a dramatist with 'Regina Sarpi.' His novels deal with the life and characteristics of the French bourgeoisie, and are extremely popular in his own country; several of his works have been translated into English successfully and he has dramatized many of his novels. Among his works are: 'Serge Panine' (1880); 'La Grande Marnière' (1885); 'Le Droit de l'Enfant' (1894); 'Gens de la Noce' (1900); etc.

Oil, an animal, mineral, or vegetable liquid, of more or less viscid consistence; nearly insoluble in water, but dissolves in alcohol or ether, and takes fire when heated in air, burning with more or less luminous flame. Oils are of various kinds, mineral, vegetable, essential, animal, and fixed or fat oils. Petroleum and naphtha come under the head of mineral oils.

Oils in Chemistry are all neutral fatty substances which are liquid at ordinary temperatures. The mineral oils, and many of the volatile oils of vegetable origin are simply compounds of carbon and hydrogen, but the larger proportion of vegetable and animal oils contain oxygen in addition, while a few also contain nitrogen and sulphur, as in oil of mustard. The vegetable and animal oils containing oxygen are mostly glycerides of fatty acids, and are characterized by being insoluble in water, slightly soluble in alcohol, but readily soluble in ether.

Oils in Botany are those in the form of minute drops in the cells of many, if not of nearly all, plants. They are of two kinds, essential and fixed oils, the former being special secretions in glands, glandular hairs, and hairs on parts exposed to light. Fixed oils are found chiefly in the cells of tissues, and have a relation to, or, at times, seem to occur as substitutes for starch. Some fruits contain oil in their perisperms; spores of cryptogamic plants and pollen grains have it in abundance.

Oils in Art are the fixed oils used in painting on canvas, etc., such as linseed, walnut, and poppy. They are expressed and purified in various ways, and rendered drying by the addition of the oxides of lead or zinc. Cold drawn linseed oil is the best for use, especially after being boiled upon charcoal to separate the mucilage and other impurities. These oils are the vehicles or media in which the pigments are ground and diluted for use; they should be pale in color, limpid, and transparent, and should dry quickly. The essential oils used in painting are those of turpentine for diluting the pigments ground in oil, and of spike or lavender for wax and enamel painting.

Essential Oils.— The essential oils have been arranged in four classes: (1) The hydrocarbons. (2) The oxygenated oils. (3) The sulphur oils. (4) The artificial oils or volatile oils, prepared by destructive distillation, fermentation and other processes. (For a detailed account of essential oils used in perfumes, soaps, etc., see the article AROMATIC COMPOUNDS.) The essential or volatile oils chemically considered do not form a natural class, for under them are included bodies of quite different constitution, and very frequently they are mixtures of different bodies. Thus oil of wintergreen is an ether, oil of cloves a phenol, oil of cinnamon an aldehyde, and so on. When they are mixtures they usually contain a hydrocarbon and an oxygen compound, which are sometimes separable by fractional distillation. At other times they may be separated by taking advantage of some striking property of the class to which one of the constituents may belong.

Fixed Oils are of two classes, drying and non-drying oils. The former class includes all oils which thicken when exposed to the air through the absorption of oxygen, and are converted thereby into varnish. They are all of vegetable origin, such as linseed, nut, poppy, and hemp-seed oil. Among those of the non-drying class are olive, cottonseed, colza, rape, ground-nut, castor, croton, etc. The non-drying oils (whether of vegetable or animal origin) when exposed to the air also undergo a change, resulting in the formation of acrid disagreeable smelling acid substances; this decomposition, which is only partial, seems to be brought about by the presence of cellular matter derived from the plant or animal which has yielded the oil, this substance acting as a ferment on the fatty matter, such acids as butyric, caproic, valerianic, etc., being thereby produced. The fixed oils are for the most part glycerides, that is, ethers of the triatomic alcohol glycerine, and are resolved by saponification into glycerine and such fatty acids as stearic, palmitic, and oleic. (See GLYCERINE.) The fixed vegetable oils are generally prepared by subjecting the seeds of the plant to pressure with or without heat; the animal oils are, for the most part, the fluid parts of the fat of the animal, and are separated by heat alone.

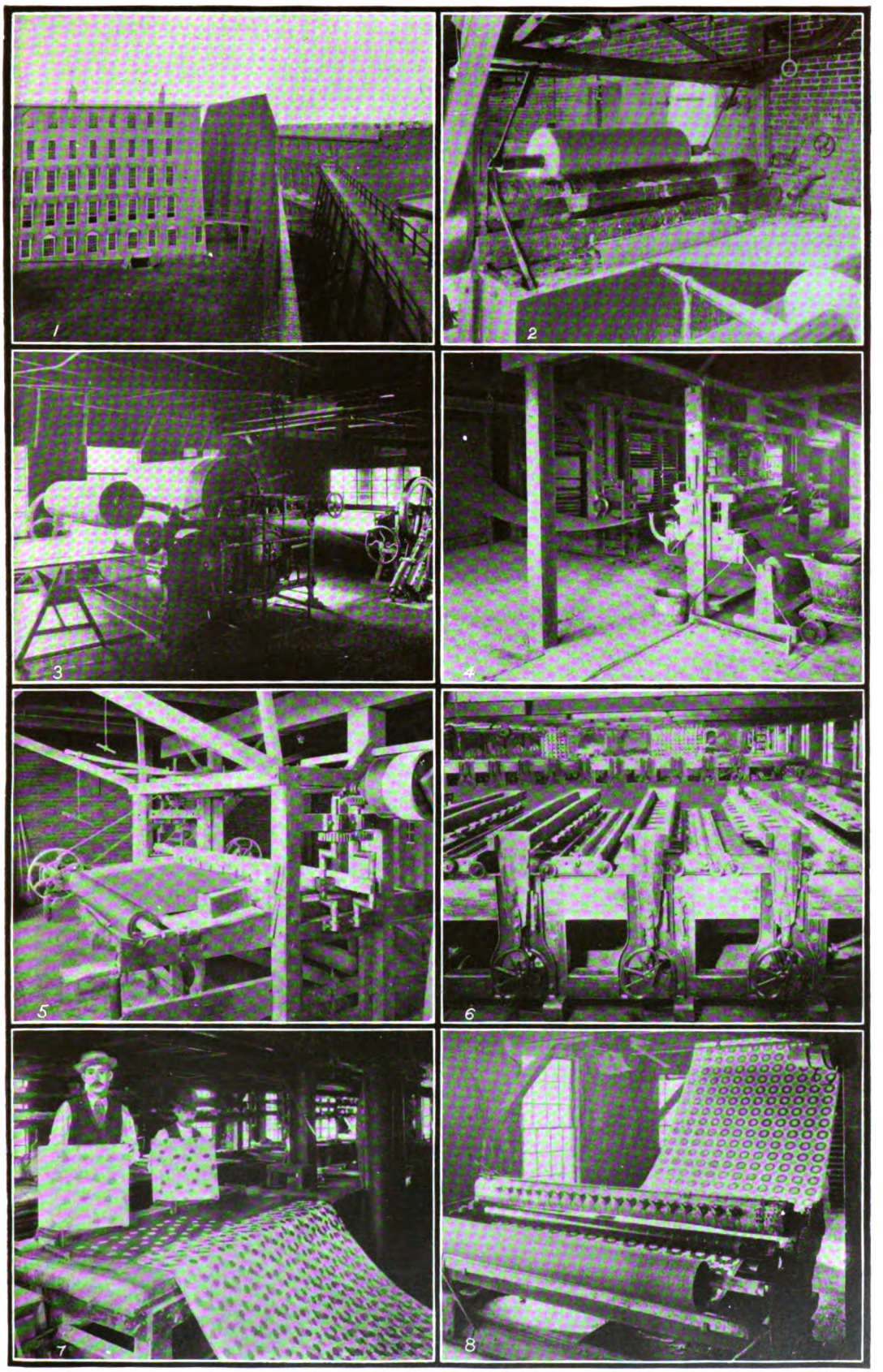
Animal Oils.— The animal oils comprise neat's-foot oil, train-oil, seal-oil, sperm-oil, porpoise-oil, cod-liver oil, shark-oil, etc. The uses of the fixed oils are very various. Many form important articles of food, others are used in medicine, numbers as lubricants, some in the composition of paints and varnishes. Others again are important sources of artificial light, or are extensively employed in the manufacture of soap, for this purpose being treated with an alkali.

Mineral Oils.— See KEROSENE; NAPHTHA; PETROLEUM.

Oil Gas.— Various oils, wax, tallow, and other substances when passed through heated tubes are resolved into combustible gases, which burn with a rich light. Oil gas was commonly used before the refining of petroleum and the introduction of electricity.

Oil as Fuel.— The production of successful

MANUFACTURE OF OIL-CLOTH.



1. Fire Wall and Railroads.
2. Sizing Machine.
3. Calender End of the Sizing Machine.
4. Painting Machine and Drying Racks.
5. Rubbing Machine.
6. Printing Machine Running Nine Colors.
7. Hand Printing a Mosaic Pattern.
8. Varnishing the Printed Oil-Cloth.

Uofm

oil burners has resulted in the application of oil fuel to locomotives and marine transportation on a rapidly increasing scale; the locomotives of the roads that pass through the petroleum fields being in some cases almost exclusively operated by oil, while there are lines of steamers in which the use of oil fuel is also nearly exclusive. The most important tests in this country were those carried out on the steamship Mariposa, in a report on which Rear-Admiral Melville expressed his conviction that by future experimental work the engineering features of the problem would undoubtedly be solved, so as to render the fuel satisfactory to commercial interests, if not for use in the navy. See PETROLEUM.

Oiled Roadbeds.— A modern plan of making roadways dustless by incorporating crude oil into the dust of an ordinary earth road for the purpose of holding the dust down and securing a permanent roadbed has been introduced successfully on highways in various parts of the country, particularly in California, and the same scheme is now being utilized to secure dustless roadbeds on several of the principal railroads of the country. The system has proved so satisfactory that it is being rapidly extended, and at the present time there is an aggregate of over 1,000 miles of oiled roadbed on the various railroad lines of the United States. See PETROLEUM.

Oil-beetle. See BLISTER-BEETLE.

Oil-bird, or **Gua'charo,** a remarkable South American bird, allied to the nightjars, but now set apart in the family *Steatornithidæ,* which contains only one species (*Steatornis caripensis*). It has the general form of a large nightjar, but differs in having a strong bill and in feeding on hard and dry fruits. It is about the size of a common fowl; the plumage brownish gray, with small black streaks and dots. The guacharo is found from Trinidad southwestward through Venezuela to Peru, and is widely known as the oil-bird, on account of the large amount of fat which the bird usually has, especially when young. It spends the day in deep and dark caverns, where great numbers congregate and make their nests on ledges in the shape of clay bowls, in which two dull white eggs are laid. Consult Newton, 'Dictionary of Birds' (1896).

Oil Cake. See FLAXSEED.

Oil City, Pa., city, in Venango County; at the junction of Oil Creek and the Allegheny River, and on the Pennsylvania, the Lake Shore & M. S., and the Erie R. R.'s; about 130 miles north by east of Pittsburg. It was settled about 1825, but was only a small place, with but few local manufactories, until the oil wells of the vicinity were developed in 1860. It was incorporated as a borough in 1863, and chartered as a city in 1874. A terrible catastrophe occurred on 5 June 1892; burning oil came down Oil Creek from Titusville, a distance of 18 miles, and swept over the city. More than 100 persons were killed and property to the amount of about $1,010,000 was destroyed. The city is in the midst of the celebrated oil fields of Pennsylvania, and many of its industries are connected with the marketing of petroleum. Some of the prominent buildings are the Oil Exchange, the Standard Oil Company office buildings, the city hospital, church and school buildings, and several building blocks. The educational institutions are the public and parish schools and the Carnegie Free Library. The government is vested in a mayor, who holds office three years, and a council. The school board, assessors, treasurer, and comptroller are elected by the people. The city owns and operates the waterworks. Pop. (1890) 10,932; (1900) 13,264.

Oil Cloth. See FLOOR-CLOTH.

Oil-fish, the colloquial name of several fishes notable for yielding oil, as the menhaden (q.v.) of the eastern United States. Specifically, the Russian golomynka (q.v.).

Oil Fuel. See OIL; PETROLEUM.

Oil Gas. See OIL.

Oil of Mustard, a volatile pungent and irritating oil formed in mustard by fermentation when it is wet.

Oil Painting, a method of painting in which the pigments used are ground in linseed oil, made from the seed of the flax plant, or in poppy oil; in many respects the most valuable of the various processes at the command of the artist who works in color. Apparently unknown to the ancients, and but little used by the earlier painters of the Renaissance in Italy, it has gradually come into wider use in succeeding schools of art, and at the present day has very largely superseded the older methods of tempera, encaustic and fresco, even for monumental mural paintings. In the important art of scene painting (q.v.) the use of distemper still prevails, for various reasons of practical convenience. The technical disadvantages under which the artist painter labors are probably reduced to a minimum by the use of oil colors, but they are by no means entirely removed. The oil itself is a yellow vehicle, and has a tendency to cause the colors to both yellow and darken with age; the pigments — even with all the science of modern chemistry applied to their fabrication — are frequently unreliable, being affected by time, by exposure to the atmosphere, smoke, gas, etc., by being mixed with each other, or even by contact with the steel of the palette knife, and, many of them, having a tendency to become useless by drying in their tubes. Paintings executed in this medium, liable to deterioration through all these causes, are also frequently injured by unskilful or careless technical methods,— cracking when the glazing or over-painting has been applied before the first painting was thoroughly dry, or because of the use of a medium, a varnish or a dryer, which does not dry nearly simultaneously with the pigments. Many of the paintings of the modern French school, executed in the highest period of the contemporary art, and by the recognized masters of the school, have cracked within twenty-five years of their execution. The use of bitumen — a great temptation to many painters because of its luminous, warm, dark tones — very frequently causes the painting to crack, as notably in the works of Munkacsy (q.v.). To prevent the yellowing of the oil vehicle it is usually thinned with turpentine, or is replaced in the painter's palette cups by a mixture of Siccatif de Harlem and turpentine, or turpentine alone, or refined kerosene, or even by some of the retouching varnishes. The use of an ab-

sorbent ground to paint upon also lessens this danger (while diminishing very considerably the lustre and beauty of the colors); Puvis de Chavannes (q.v.) used the common oil colors on a canvas prepared with plaster. Want of sunlight also causes oil paintings to yellow, and they can be partially restored by exposure to that light. Zinc white is much the safest white to use with oil. Oil painting cannot be used directly on a plaster wall because of the combination of the caustic lime with the oil, thereby forming a soap which destroys the durable qualities of the pigments and causes them to redden or yellow. The modern mural painters adopt the safer method of painting their pictures on canvas, which is then fastened to the wall with white lead. This method has the advantage of dispensing very largely with the disagreeable necessity of working on scaffoldings, frequently at a great height from the ground, as the old painters did. In general, heavy impasto, or the application of much color by many repaintings, and scumbling or glazing of thin color over another underneath, are more apt to lead to deterioration of the painting than the use of nearly pure colors applied sparingly and with but little thinning medium. The slow but gradual destruction of many of the world's masterpieces in this manner is a heavy loss; the paintings in the great Louvre galleries in Paris, left uncleaned, darken very perceptibly in the course of twenty years.

The invention of oil painting was ascribed in Vasari's time to the Flemish painter Jan van Eyck (q.v.) (died 1440), but something, at least, of the art had been known much earlier. In a technical work, the 'Book of Art' by Cennino Cennini, one of the later followers of Giotto (q.v.) (1276–1336), the mixing of pigments with boiled linseed oil is mentioned, though not with reference to artistic works. The brothers Van Eyck (Hubert and Jan), seem to be entitled to the honor of having first availed themselves of the great advantages possessed by the oil pigments with their slow drying qualities, which permitted the mingling of the colors on their palettes and their canvases. In the old tempera painting, the colors were laid on and dried, practically, one at a time. In the first half of the 15th century the painters of northern Italy heard of the new method of the Van Eycks, and experimented with it; Antonello da Messina (q.v.), a Sicilian painter (1414?–1496?), saw in the possession of Alphonso, king of Naples, a painting by Jan van Eyck, and was so much impressed by it that he journeyed to Bruges to study the new art, and brought it back to his compatriots in 1465. It was practised in Tuscany earlier than in Venice, and with different methods in Florence and Venice, but its adoption was gradual. It is related that Sebastiano del Piombo lost the friendship of Michelangelo (q.v.) by endeavoring to induce him to adopt this method for his 'Last Judgment' in the Sistine Chapel; and the almost complete destruction of Leonardo da Vinci's (q.v.) 'Last Supper' (1498) is attributed to the use of oil on the plaster wall, while the fresco (*buon fresco*) of the 'Crucifixion' by Donato Montorfano, painted in 1495, is still in good condition, though exposed to the same unfavorable conditions. Some of the Italian painters, including Perugino (q.v.), Pollajuolo (q.v.), and Andrea Verrocchio (q.v.), employed a mixed method, partly oil and partly a species of tempera, in their easel pictures. A few of the moderns, as Gustave Moreau (q.v.), have combined this method with water-color, or other processes. It is remarkable that the very earliest oil paintings, those by the Van Eycks and their Flemish contemporaries, are among the most perfectly preserved of any that have come down to us. Several attempts to discover a satisfactory substitute for oil have been made in modern times, as, the water-glass (stereochromy) invented by the German chemist Von Fuchs, and practised by Kaulbach and his school and by the English painter Maclise, used for mural painting; the mixture of copal, wax, resin and oil by Lord Leighton and some of his compatriots in mural work, and, the latest, the «solid oil colors» of Jean François Rafaelli, the Parisian painter, for easel pictures. For the preference displayed by modern artists for this medium there are several reasons,— general convenience and ease of handling, and certain properties in the oil medium which seem to enable the painter better to represent — or, at least, suggest — the material aspects of Nature and of both animate and inanimate objects, real or imaginary. The materials and processes of tempera (q.v.), fresco (q.v.), water-color (q.v.), and pastel (q.v.), all possess various disadvantages, both material and artistic, for general use.

Consult: Dufresnoy et de Marsy, 'L'Ecole d'Uranie ou L'Art de la Peinture' (1753); Blanc, 'Grammaire des Arts du Dessin'; Couture, 'Methode et Entretiens d'Atelier'; Vibert, 'Peinture à l'huile'; Eastlake, 'Materials for the History of Oil Painting'; Cennini, 'Treatise on Painting.'

WILLIAM WALTON,
Author of 'Chefs d'Œuvre; Exposition Universelle 1889.'

Oil-palm. See PALM-OIL.

Oil Shark, a small shark (*Galeorhinus zyopterus*) of the southern Pacific coast, allied to the topes, grayish, and often six feet in length. Its liver yields a large quantity of valuable oil, and its fins are highly prized by the Chinese as a material for soup; hence this fish is sometimes called «soup-fin shark.»

Oil-stone, a slab of fine-grained stone, set in a wooden block and provided with a wooden cover, used for imparting a keen edge to tools; it is so called because oil is used for lubricating its rubbing surface.

Oil Wells. See PETROLEUM INDUSTRY, THE.

Oiled Roadbeds. See OIL; PETROLEUM.

Oise, wäz, (1) a river of France, which rises near Selogne on the frontier, in the forest of Thierache, among the Ardennes, Hainaut, Belgium, flows southwest across the departments of Aisne-et-Oise, and joins the Seine about six miles below Pontoise in the department of Seine-et-Oise. (2) A northern department of France named after the river. Area, 2,272 square miles; pop. (1901) 407,808. Capital, Beauvais.

Ojéda, ō-hā'dä, Alonzo de, Spanish cavalier and explorer: b. Cuenca about 1468; d. Santo Domingo 1515. He sailed with Columbus on his second voyage in 1493, and thereafter identified himself intimately with the exploration and occupation of the New World. In 1495 he performed a feat of great boldness in

the capture of the cacique Caonabo, whom he took by means of a stratagem from among the Indians of his tribe, thus preventing a probable alliance of the aborigines against the Spaniards. In 1499, with Juan de la Cosa, former pilot of Columbus, and accompanied also by Amerigo Vespucci, he explored the northern coast of South America from a point probably on the north of the present Brazil westward to the Gulf of Venezuela (q.v.), trading for pearls and gold with the Indians whom he found. On a charge of trespassing, during a second voyage in 1502, upon territory belonging to Portugal, he was arraigned after his return, and punished by censure and fine. After being imprisoned for debt in Spain, he sailed for the third time for South America in 1505, and explored to the Gulf of Darien. In November 1509, with over 300 men, he set sail from Hispaniola for Nueva Andalucia, between the Gulf of Darien and the Gulf of Venezuela, of which territory he had been appointed governor. Landing with about 75 men near the site of the present Cartagena, he attempted to capture Indians for slaves, but his intended victims turned the tables, overwhelmed their assailants, and killed the entire party with the exception of Ojéda himself and one other. Ojéda next established a colony at San Sebastian, but the Indians were resentful toward him; the Spaniards, mainly confined within their defensive quarters, ran short of provisions, and their leader, sailing for Hispaniola in quest of reinforcements and supplies, was shipwrecked on the coast of Cuba, and although he finally reached Santo Domingo, found himself unable to accomplish the object sought, and ended his days in poverty and wretchedness.

Ojéda, Emilio de, Spanish diplomat. After holding several minor diplomatic posts he became first secretary of the Spanish embassy at London in 1880, was *chargé d'affaires* in Bolivia, and in 1883 minister resident in Montevideo, in 1884 at Lima, and at Athens 1888. In 1890 he was promoted minister plenipotentiary to Peru, and to Morocco in 1894. He was appointed secretary of the Spanish commission to arrange a treaty of peace with the United States in 1898, and succeeded the Duke de Arcos as minister to the United States in June 1902.

Ojibway (ō-jīb'wā) **Indians.** See CHIPPEWAS.

Oka, ō'ka, Canada, a Catholic mission settlement of Iroquois, Algonquin, and Nipissing Indians, on the Lake of Two Mountains, near Montreal. It was settled by some 900 Iroquois Catholic converts from Sault au Recollet, in 1720, who were shortly afterward joined by Algonquin and Nipissing from the Isle aux Tourtes. The Mohawk and Algonquin languages are spoken by the respective bodies, who inhabit different sections of the village and number over 400. A branch settlement exists at Gilson, Ontario, since 1881.

Oka, ō-kä', two rivers of European and Asiatic Russia. (1) Oka, in Europe, rises in the government of Orel, flows north till near the town of Kaluga, then east past that town, east-northeast across Riazan and the east of Vladimir, and after a course of about 600 miles, navigable from Orel, joins the Volga at Nijni-Novgorod. (2) Oka, Asiatic Russia, rises in the mountains between China and the government of Irkutsk, flows north-northeast for 400 miles, and joins the Angara at Bratsk.

Oka'pi, the native African name of a large animal (*Ocapia johnstoni*) of the giraffe family which inhabits the forests of the upper Kongo Valley. It had been vaguely known previously, but the first specimen and description given to science were obtained by Sir Harry Johnston in 1899, in the Semliki forest, near the Uganda border. The animal has many of the features of a giraffe, such as drooping hindquarters, a short tufted tail, and a skull of similar shape, with vestiges of three horn pedicels or cores, but, of course, no external horns. The neck is short, thick, and maneless. The head is long and narrow, the ears large, the eyes far from ears, and the lips prolonged and mobile, suited to grasping the leaves of trees, upon which they are said by the negroes to feed. The size is that of a medium antelope, about 4½ feet tall at the withers. The colors are remarkable. The head, neck, and body generally, as described by Johnston, range in color from warm purplish red to sepia and jet-black; but the cheeks are yellowish-white; the legs are cream-white on their lower part, and above broken into rings or stripes of alternate black and white, extending on the hams up to the root of the tail. A single stuffed and mounted skin is deposited in the British Museum.

These animals seem uncommon, and dwell in almost inaccessible forests, where they are said to go about alone or in pairs. It is probable that they may be the lingering survivors of a species now nearly extinct which formerly ranged far more widely, especially to the northward, since Egyptologists at once recognized this animal as the prototype of the figure of the ancient Egyptian deity Set, whose curious head has heretofore eluded identification. For the discovery of the okapi, consult 'Transactions' and 'Proceedings' of the London Zoological Society (1901, 1902); and for its identification with the figure of Set, consult 'Scientific American Supplement' (28 March 1903), and the writings of Wiedemann.

Okayama, ō-kä-yä'mä, Japan, a town and capital of a prefecture of Bizen, on the island of Hondo, near the shore of the Inland Sea separating it from Shikoku, about 70 miles to the west of Kobé. Pop. (1898) 58,025.

Okeechobee, ō-kē-chō'bē ("Big Water"), a lake in Florida, in the southern part of the State. It is about 40 miles long and 28 miles wide; area, about 1,185 square miles, and depth from a few inches to 13 feet. It is on the northern border of the Everglades (q.v.), and it seems to be changing slowly, as no doubt the Everglades have changed. Vegetation is increasing within the lake and the marshy shores are encroaching upon the lake boundaries. Caloosahatchee River, by means of canals, has been made an outlet, but considerable of the water spreads over the Everglades. The canals mentioned have reduced the area of the lake and drained portions of the Everglades so as to make them suitable for raising certain crops. Okeechobee is the largest lake in the Southern States.

Okefinoke (ō-kĕ-fī-nō'kē) **Swamp,** in the southeastern part of Georgia, occupying nearly

all of Charlton County, and parts of Ware and Clinch counties, and extending into Baker County in Florida. The area is about 500,000 acres. In the eastern part is a lake containing several small floating islands, the marshy shores of which show the same formation as Okeechobee (q.v.) Lake in Florida. In some parts of the swamp are large trees and a dense low vegetation. Alligators and moccasins inhabit this swamp in large numbers.

O'Kel'ly, James, American Methodist Episcopal minister: b. Ireland about 1757; d. 1826. He came to this country, where in 1778 he became a Methodist preacher, traveling from place to place. When the Methodist Episcopal Church in the United States was organized (1784) he was one of the elders ordained, and later he held the position of presiding elder in the district of South Virginia. He was soon afterward found in opposition to his denomination regarding the life-tenure and powers of the bishops, and the General Conference of 1792 was followed by his withdrawal, which led to the first secession from that ecclesiastical body, several churches and ministers joining with O'Kelly to form the Republican Methodist Church. After this his attitude toward his former connection became more hostile, and he proclaimed the spuriousness of ordination. By 1795 the defections from the Methodist Episcopal Church caused by O'Kelly's agitation reached almost 6,500. His Republican Methodist Church changed its name to «Christian Church,» but in less than a quarter of a century afterward it dwindled away. Consult: Buckley, 'History of Methodism in the United States' (1897).

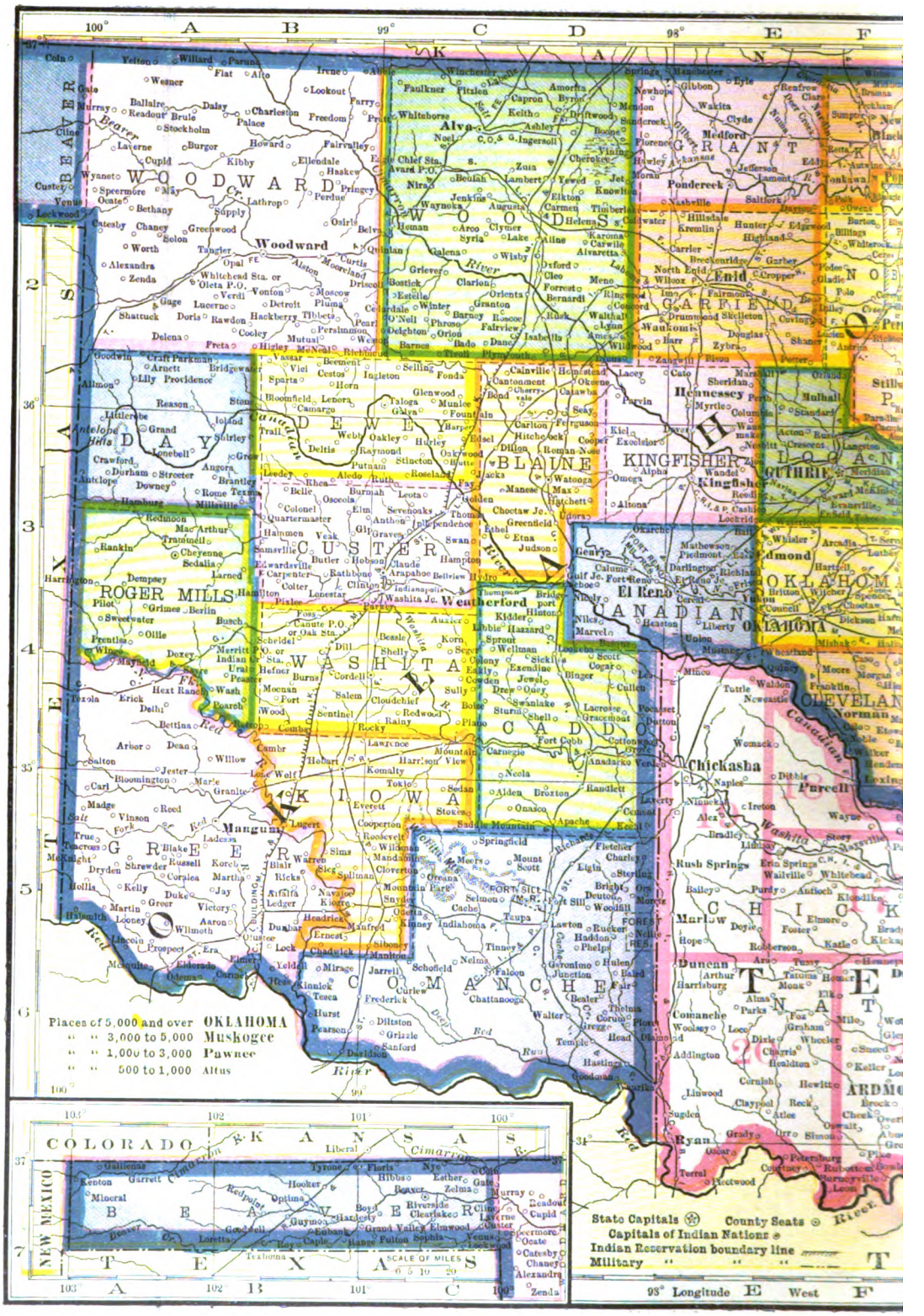
Oken, ō'kĕn, **Lorenz,** German naturalist: b. Bohlsbach, Würtemberg, 1 Aug. 1779; d. Zürich 11 Aug. 1851. His real name was Lorenz Ockenfuss, abridged to Oken when he became a private teacher at Göttingen, having previously studied natural history and medicine at the University of Würzburg. In 1802 he published 'Grundriss der Natur-Philosophie,' in which he reduced to a system the materials Fichte and Schelling had previously undertaken to arrange; in this he maintained that animal classes are simply a representation of the organs of sense, and divided the animal kingdom accordingly into five classes. In 'Die Zeugung' (1805) he advanced the doctrine that all organic beings originate from and consist of vesicles or cells. In 1807 he became extraordinary professor of the medical sciences of the University of Jena, giving for his inaugural discourse the famous essay 'Ueber die Bedeutung der Schädelknochen,' or 'On the Signification of the Bones of the Skull.' In 1808 he announced the propositions that organism is a combination of the activities of the universe within a single individual body, and that world and organism are one in kind; that light is only a polar tension of the ether evoked by a central body in antagonism with the planets, and heat only the motion of this ether. His 'Lehrbuch der Natur-Philosophie' appeared 1809–11. In 1816 he began the publication of his periodical, the 'Isis,' devoted principally to natural science, but occasionally commenting on the politics of the German states; the criticisms on the latter led to complaints, and the court of Weimar required him either to suppress the 'Isis' or to resign his professorship; he chose the latter alternative, and published his journal at Rudolstadt uninterruptedly until 1848. In 1821 he originated the annual general meetings of German naturalists in different cities, the first of which was held at Leipsic in 1822; the British and American associations for the advancement of science have been since then instituted more or less after the German model. In 1833 he was appointed professor of natural history in the University of Zürich, which position he retained until his death.

Okhotsk, ō-hŏtsk', **Sea of,** a considerable portion of the North Pacific Ocean, indenting the eastern coast of Siberia, and partly enclosed by Kamchatka, the Kurile Islands, and Saghalien Island. It is named after the seaport of Okhotsk on its shores.

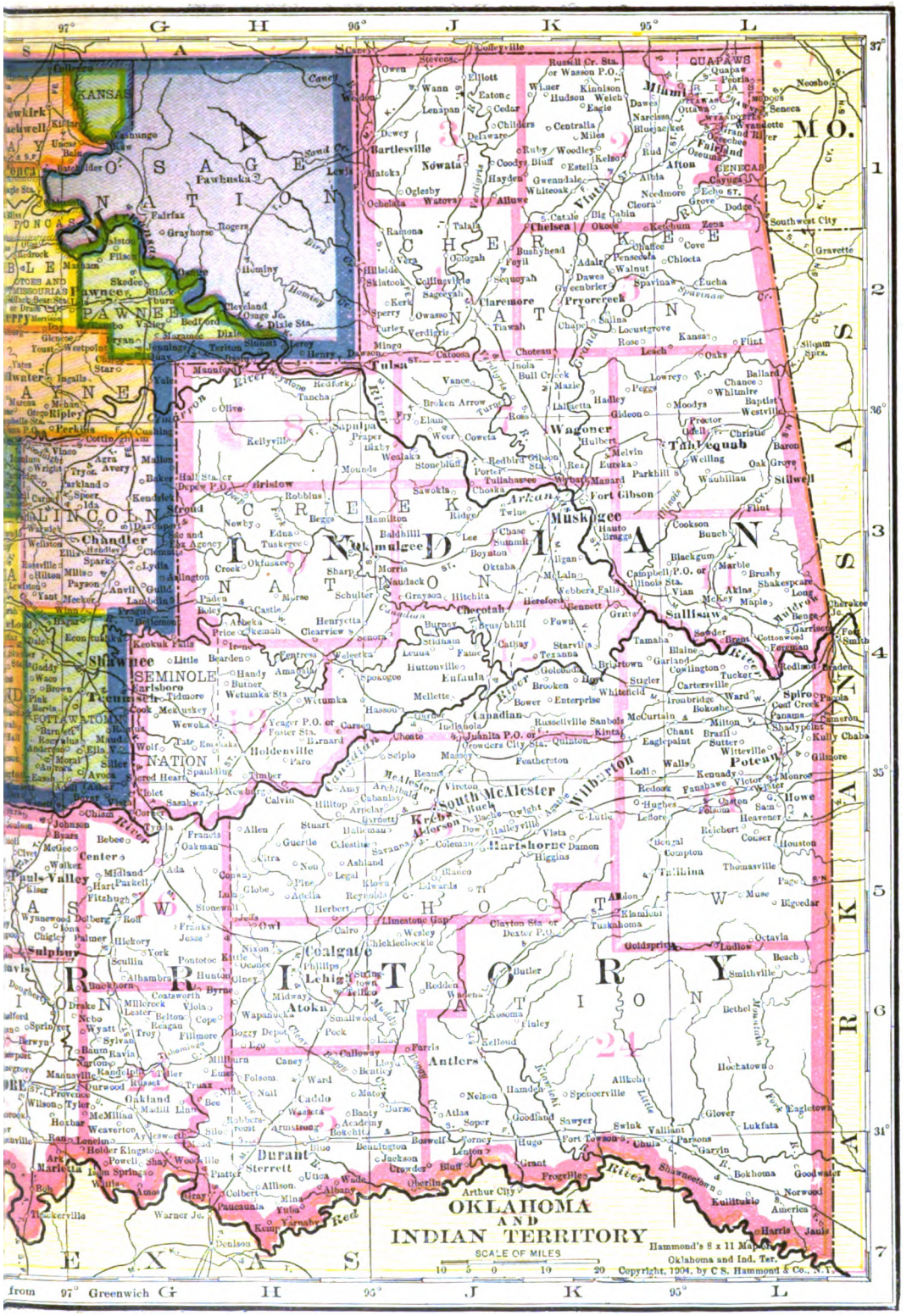
Oklahoma, ōk-la-hō'ma, a Territory of the United States, in the south central part; bounded on the north by Colorado and Kansas, on the east by Indian Territory, on the south by Indian Territory and Texas, and on the west by Texas and Colorado. The northern boundary is lat. 37° N., and the point farthest south on the irregular southern boundary, is at 34° N. The Territory lies between lon. 96° and 103° W. Its extreme length from east to west is 383 miles, and its width from north to south is 205 miles. Across the southern part from east to west is 190. The area is 39,030 square miles, of which 200 square miles is water surface (U. S. Census, 1900).

Topography.—The surface of the eastern part of the Territory is rolling land; on the east side of the North Fork of the Canadian River, and nearly parallel with the stream, are the Chautauqua Mountains, which are really a chain of hills. In the southern part of the Territory are the Wichita Mountains, a group of granite mountains, some of the peaks 1,000 feet from the base. The highest land is in the extreme northwestern part, a portion of the Great Plains which increase in altitude toward the west until they reach the Rocky Mountains. Along the northwest boundary are peaks from 1,000 to 5,000 feet in height. The divides extend southeast and northwest; the river basins within the Territory are long and narrow. The Arkansas River crosses the northeast corner of the Territory. The Salt Fork of Arkansas River enters the Territory from the north, a little west of the centre of the northern boundary, and flows east into the Arkansas. The Cimarron, whose headwaters are in the southeastern part of Colorado, enters the Territory from Kansas and flows southeast and northeast and enters the Arkansas on the Indian Territory boundary. The Canadian enters Day County from Texas, crosses the Territory, and flows into the Indian Territory. The Red River forms the southern boundary and receives a number of large tributaries from Oklahoma, principally the Washita and the North Fork of the Red.

Climate.—The records from 1892 to 1900 show a maximum temperature of 115° F. and a minimum of 25° F. below zero. In both cases the temperature was remarkably unusual, an extreme. The average for July is 81.2° and for January, the coldest month, 36.9°. The cold season is short. The rainfall is distributed over all the year, averaging 31.7 inches. The rainfall is greater in the eastern part; the smallest



Places of 5,000 and over OKLAHOMA
" " 3,000 to 5,000 Muskogee
" " 1,000 to 3,000 Pawnee
" " 500 to 1,000 Altus
State Capitals
County Seats
Capitals of Indian Nations
Indian Reservation boundary line
Military " " "
Longitude
West
COLORADO
KANSAS
NEW MEXICO
TEXAS
SCALE OF MILES
0 5 10 20
WOODWARD
DAY
DEWEY
BLAINE
KINGFISHER
GARFIELD
GRANT
CUSTER
ROGER MILLS
WASHITA
KIOWA
CADDO
CANADIAN
OKLAHOMA
CLEVELAND
GREER
COMANCHE
CHICKASHA
Woodward
Alva
Enid
Kingfisher
Weatherford
El Reno
Chickasha
Mangum
Lugert
Duncan
Marlow
Ryan
Norman
Purcell
Edmond
Hennessey
Waukomis
Ponderock
Medford
Pawnee
Cimarron
Canadian
Washita
Red
Salt Fork
Beaver
Antelope Hills


OKLAHOMA
AND
INDIAN TERRITORY
SCALE OF MILES
10 5 0 10 20
Hammond's 8 x 11 Map of Oklahoma and Ind. Ter.
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from 97° Greenwich
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37° 36° 35° 34° 1 2 3 4 5 6 7
KANSAS
M O.
TEXAS
OSAGE NATION
CHEROKEE NATION
CREEK NATION
SEMINOLE NATION
CHICKASAW NATION
CHOCTAW NATION
QUAPAWS
SENECAS
Pawhuska
Bartlesville
Nowata
Chelsea
Claremore
Pryor Creek
Tulsa
Wagoner
Muskogee
Fort Gibson
Tahlequah
Stilwell
Sallisaw
Checotah
Eufaula
Holdenville
Wewoka
Shawnee
Chandler
Stroud
Kingfisher
Guthrie
Perkins
Cushing
Ripley
Yale
Drumright
Sapulpa
Kellyville
Broken Arrow
Coweta
Haskell
Porter
Wealaka
Mounds
Bristow
Depew
Sapulpa
Sand Springs
Red Fork
Keystone
Oilton
Kiefer
Mannford
Olive
Cleveland
Dixie
Terlton
Slick
Henry
Catoosa
Inola
Bull Creek
Vance
Lowrey
Peggs
Whitmire
Chance
Ballard
Baptist
Westville
Proctor
Gideon
Moodys
Pecan Hill
Oaks
Flint
Kansas
Rose
Locust Grove
Salina
Chouteau
Leach
Sloan Spgs.
Oak Grove
Baron
Christie
Welling
Wauhillau
Oaks
Hulbert
Melvin
Eureka
Parkhill
Redbird
Gibson Sta.
Wyber
Manard
Tullahassee
Choska
Arkansas
Illinois
Sawokla
Ridge
Twine
Hamilton
Berry
Buddhill
Lee
Summit
Boynton
Oktaha
Morris
Haskell
Taft
Hilliard
Hanna
Warner
Gore
Webbers Falls
Hitchita
Grayson
Carson
Canadian
Stidham
Cattay
Starvia
Texanna
Bruner
Golden
Brooken
Enterprise
Whitefield
Ironbridge
Bokoshe
Cameron
Panama
Kinta
Russellville
Sanbois
McCurtain
Chant
Braziel
Eagle Pass
Butler
Witterville
Potcau
Walls
Lodi
Kennady
Redlock
Fanshawe
Victor
Howe
Heavener
Poteau
Gilmore
Monroe
Spiro
Page
Muse
Bigcedar
Talihina
Thomasville
Reichert
Conser
Houston
Compton
Bengal
Higgins
Hartshorne
Damon
Vista
Coleman
Savanna
Celestine
Stuart
Hailman
Archer
Garrett
Krebs
Alderson
Buck
Dwight
Wilburton
Lutie
Ledore
Folsom
Sam
Quinton
Tuskahoma
Clayton Sta. or Dexter P.O.
Limestone Gap
Wesley
Chickleechoockie
Cairo
Owl
Stonewall
Atoka
Coalgate
Lehigh
Phillips
Midway
Smallwood
Caney
Millburn
Folsom
Ward
Caddo
Nail
Bee
Matoy
Nelson
Hamden
Spencerville
Allkehi
Bethel
Rosoma
Finley
Kellond
Antlers
Farris
Lloyd
Bentley
Wapanucka
Boggy Depot
Pock
Callaway
Ashland
Legal
Klowa
Edwards
Reynolds
Adella
Globe
Conway
Ada
Stonewall
Franks
Jesse
Pontotoc
Hunton
Olney
Byrne
Scullin
Alabama
Buckhorn
Coalgate
Phillips
Sulphur
Hickory
Palmer
Chigley
Wynnewood
Dolberg
Roff
Paul's Valley
Harparkell
Fitzhugh
Midland
Center
Bebee
Johnson
Byars
McGee
Walker
Kiser
Lindsay
Maysville
Rush Springs
Chickasha
Tuttle
Minco
Amber
Bradley
Verden
Blanchard
Newcastle
Noble
Norman
Purcell
Lexington
Wayne
Pauls Valley
Wynnewood
Sulphur
Ardmore
Marietta
Thackerville
Denison
Durant
Sterrett
Utica
Albany
Allison
Colbert
Caddo
Kemp
Yarnaby
Yuba
Mina
Pancania
Warner Jc.
Red River
Arthur City
Oberlin
Grant
Frogville
Blue
Jackson
Crowder
Boswell
Hugo
Fort Towson
Swink
Valliant
Lukfata
Glover
Eagletown
Broken Bow
Goodland
Sawyer
Soper
Atlas
Banty
Waukita
Bokchito
Armstrong
Academy
Benington
Lenton
Grady
Garvin
Parsons
Chula
Bokhoma
Goodwater
Norwood
America
Harris
Jauls
Kullituklo
Hochatown
Little River
Mountain Fork
Glover
Lukfata
Swink
Valliant
Fort Towson
Hugo
Boswell
Grady
Lenton

Mau

amount falls in Beaver County. The rivers tend to increase the moisture, so that the climate on the whole is suitable for agriculture in all parts of the Territory.

Geology and Minerals.—In the eastern part is the Carboniferous area, as in a large portion of the central part of the United States; the high land of Beaver County in the northwest is covered with Neocene deposits; but the most of the Territory has a surface rock of Triassic sandstone. In the southern part are found Silurian strata and Archæan rocks. Coal is found in the eastern part of the angle formed by the Arkansas and the Cimarron rivers, copper in Beaver County, building stone in many parts of the Territory, also salt, gold, silver, iron, and gypsum.

Flora.—The timber is found in the east and chiefly near the streams. In 1900 there were 4,400 square miles, or about 11 per cent of the total area, covered with timber, consisting almost entirely of black-jack and post-oak. The western part is almost treeless; various grasses grow wild and numerous flowering plants. The cactus, sage brush, and yucca are found in the extreme west.

Fauna.—See UNITED STATES.

Soil and Agriculture.—The soil of the river valleys is very fertile; it is mixed with a rich black alluvium, making a contrast to the red clay and rock formation of the uplands. A large portion of the Territory is covered with a soil suitable for agricultural purposes and at present not needing fertilizers. Agriculture and stock raising are the natural occupations for a region so situated as Oklahoma. Wheat and corn are the chief products as yet (1904). Cotton is easily cultivated, the yield per acre is excelled only by Texas. The Federal census of 1900 gives the number of farms as 62,495, valued at $123,941,235, or including farm implements, machinery, and stock, the value given was $185,343,818 for the total farm property. In 1890, the average size of the farms was 251.5 acres, and a little over 35 per cent was improved land. There were seven times as many farms in 1900 as in 1890, with nearly 10 times as great an area devoted to agriculture. The number of farms operated by owners was six times as great in 1900 as the number reported in 1890. In 1900 the largest incomes were received from hay and grain: $80,328,015. Dairy produce amounted to $6,442,276; cotton, $8,673,420. Other valuable crops were vegetables, fruit, tobacco, sugarcane, flowers (plants, seeds, and blossoms), and nursery products. Potatoes, onions, and fruit are receiving especial attention (1904). There were 5,733,385 acres of vacant government land, in the Territory in 1900; but a large portion of this land, subject to homestead entry, was in Beaver County, sometimes called «No Man's Land.»

Stock-raising.—The live-stock on the farms in the Territory in 1900 were valued at $74,101,280. In the western counties more attention is given to stock-raising than in the more fertile portions of the east. Horses, cattle, mules, swine, and some sheep are raised in all parts of the Territory.

Manufacturing.—While Oklahoma is an agricultural and stock-raising region, the manufacturing industries are increasing. The chief manufactories are flour and grist mills, cotton-gins, cottonseed-oil mills, fruit canneries, cracker factories, meat-packing establishments, machine-shops, agricultural implement shops, railroad shops, tobacco factories, and creameries.

Transportation and Commerce.—The Atchison, Topeka & Santa Fe Railroad crosses the Territory and has branch lines entering all the large cities. Other railroads that enter many of the counties are the Chicago, Rock Island & Pacific, the Saint Louis & San Francisco, the Choctaw, Oklahoma & Gulf, and with other lines which do not cross any large section of the Territory, furnish connection with many of the great trunk lines of the country. (See OKLAHOMA CITY.) The rivers are not navigable. The products exported from the Territory in large quantities are wheat, cattle, corn, cotton, hogs, coal, and manufactures.

Banks and Banking.—A strict banking law was passed in January 1898. It defines the minimum of capital invested, and the liabilities of the officers, prohibits private banking, makes quarterly reports obligatory, and provides for a bank commissioner who has well defined duties, and who is punished severely for any violations. When Oklahoma was organized as a Territory there were only three banks within the limits. In 1902 there were 219 banks, of which 67 were National and 152 State banks. The combined capital of all the banks, in 1902, was $3,518,000; the loans, $11,380,000; and the deposits, $17,017,000.

Finances.—The main sources of income are the rentals of public lands and the general tax. The total receipts in 1902 were $1,054,794, and the expenditures for the same year $778,460. The assessed value of the Territory in 1902 was $60,000,000.

Education.—A public school system has been established and provisions are made for its maintenance and operation. The income derived from rental of public lands is mainly devoted to schools; two sections of land in each township has been set apart for the support of schools. It has the University of Oklahoma (q.v.) at Norman, a Mechanical and Agricultural College at Stillwater, the Northwestern Territorial Normal School at Alva, the Normal School for Oklahoma at Edmond, and the Colored Agricultural and Normal University at Langston. In 1901 there were 13 high schools in the Territory, two of which were for colored pupils, one at Guthrie and one at Oklahoma. There were four private colleges, and a number of private academies doing elementary and secondary work. Indian schools are supported by the Federal Government. The Chilocco Industrial School in Kay County, in the northern part of the Territory, is for Indian pupils. There were 14 reservation boarding schools in 1901; and 12 mission schools for Indians and two for colored pupils, under the auspices of the Roman Catholic Church; one industrial school for the Pottawattomie Indian boys, in charge of the Benedictine Fathers, and five other mission schools under the auspices of different denominations. The people of the Territory aim to have a school house in every place where it is needed. In the larger towns and cities, there are separate public schools for Indians and negroes.

Charitable and Penal Institutions.—The insane wards of the Territory are cared for in an institution at Norman; the deaf-mutes are provided for by private institutions or are supported by Territorial funds, but cared for in the

private institutions. Oklahoma has no penitentiary (1903), but has made arrangements with Kansas whereby prisoners belonging to the Territory are sent to Kansas to be guarded, fed, and put to work until such time as their sentences expire. In January 1903 one of the convicts confined in Kansas, instituted habeas corpus proceedings before the Supreme Court of Kansas, claiming that the State of Kansas had no right to hold him prisoner for a crime committed outside the limits of the State, and that the Territory of Oklahoma had no right to sentence him to prison in the State of Kansas. At the time the question was raised there were 285 convicts belonging to Oklahoma serving sentence in Kansas.

Religion.—The Federal census of 1900 gives the number of church organizations as 900 with a membership of 70,000, and property valued at $500,000. The leading denominations were Roman Catholic, 13,804 members; Methodist E., Baptist, Missionary Baptist, and Christian, each about 7,800; and Methodist E. South, 6,340. The Protestant Episcopals, Presbyterians, Congregationalists, and other denominations have organizations.

Government.—The government of Oklahoma is administered under the Territorial laws of the United States. See TERRITORIES.

Population.—The majority of the population, about 95 per cent, are native born Americans. The Federal census for 1890 shows a population of 61,834 and for 1900, 398,331. The school census for 1902 gave a population of 570,000. The increase from 1890 to 1900 was more than 543 per cent. The Indian population is in places decreasing or changing but little. In 1900 it was 13,873.

Political Divisions.—There are 25 counties and four reservations which will be organized counties. The counties with county-seats are as follows:

Beaver, Beaver.
Blaine, Watonga.
Canadian, Elreno.
Cleveland, Norman.
*Comanche, ———.
Custer, Arapaho.
Day, Grand.
Dewey, Taloga.
Garfield, Enid.
Grant, Pondcreek.
Greer, Mangum.
Kay, Newkirk.
Kingfisher, Kingfisher.
*Kiowa, ———.
Lincoln, Chandler.
Logan, Guthrie.
Noble, Perry.
Oklahoma, Oklahoma.
Pawnee, Pawnee.
Payne, Stillwater.
Pottawatomie, Tecumseh.
Roger Mills, Cheyenne.
Washita, Cloudchief.
Woods, Alva.
Woodward, Woodward.
Kaw Indian reservation, —
Kiowa, Comanche, and Apache Indian reservation, Anadarko.
Osage Indian reservation,—
Wichita Indian reservation, ——.

*Organized since last census.

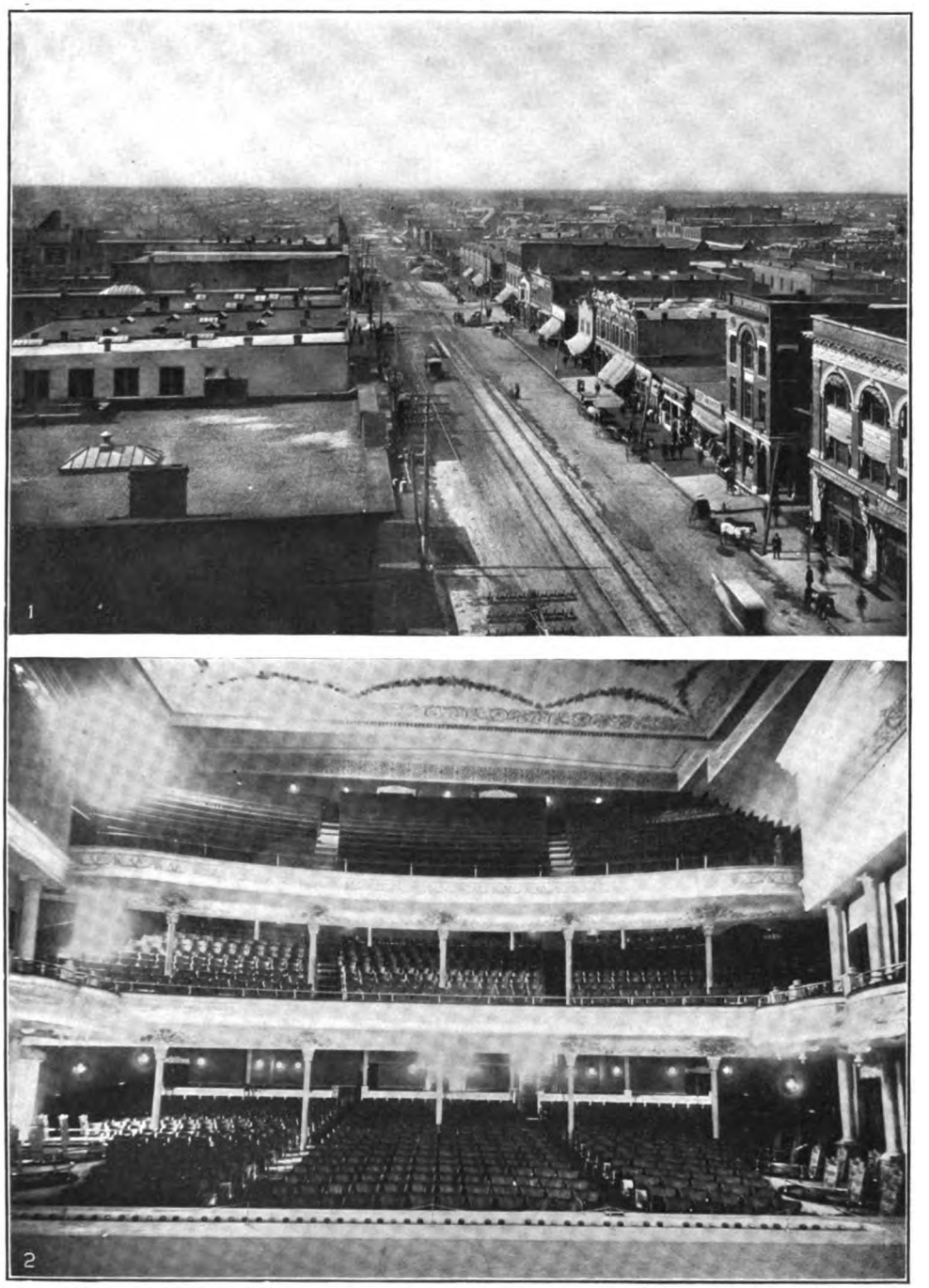
The principal cities are Oklahoma, Guthrie, Enid, Kingfisher, Hennessey, Blackwell, Chandler, Perry, Pawnee, Ponca, Newkirk, Stillwater, Shawnee, Tecumseh, Alva, Osage, and Weatherford. The rapidity of growth of some of the towns and cities has been remarkable, as well as the way in which they came into existence. The site of Thomas, in Custer County, was chosen by persons who went into the Territory on an excursion train. The train was stopped when a suitable place was found, and before night it was a good sized town with a daily newspaper.

History.—The earliest mention of the country included in Oklahoma is that by Don Diego Dionisio de Penalosa, a Spaniard who traveled through this region in 1662. He reported it as "pleasant and delightful," far exceeding in beauty "New Spain." The Louisiana Purchase of 1803 included all the land now in the Territory, except Beaver County, which was originally a part of the Republic of Texas. When Texas became a part of the United States, the lands north of lat. 36° 30′ N., the northern boundary of slave territory, were ceded to the United States, and Texas came into the Union as a slave State. Oklahoma was a part of the original Indian Territory (q.v.). The official act whereby this portion of the Reservation has become a home for white settlers, has to do with the third article of the treaty of 14 June 1866 (14 Stats., 786), wherein the Creeks ceded and conveyed to the United States to be used as homes for other civilized Indians an area estimated to contain 3,250,560 acres. The United States agreed to pay the sum of 30 cents per acre amounting to $975,168. When the ceded lands were surveyed and subdivided it was found that the area ceded contained 151,870.48 acres in excess of the estimated amount and Congress, by the act of 7 July 1884 (23 Stats., 212), appropriated money to pay for the excess.

By article 3 of the treaty of 21 March 1866 (14 Stats., 756), the United States ceded to the Seminoles 200,000 acres of the lands obtained from the Creeks under the Creek treaty above mentioned. Under the provisions of the act of 5 Aug. 1882 (22 Stats., 265), 175,000 acres lying east of the line dividing the Creek country purchased from the Creeks for the Seminoles, were also bought from the Creeks for the Seminoles. By the act of 1 March 1889 (25 Stats., 757), the Creeks ceded to the Government "the entire western half of the domain of the said Muscogee (or Creek) Nation lying west of the division line surveyed and established under" the treaty of 1866, and by the act of 2 March 1889 (25 Stats., 980), section 12, the Seminoles ceded to the Government lands estimated to contain 2,167,000 acres, being the lands ceded to them by the treaty of 1866. The survey subsequent to the treaty of 1866 showed the lands so ceded aggregated 2,037,414.62 acres. These lands together with cessions from certain other bands constitute what might be termed "Old Oklahoma." By section 10 of the Act of 3 March 1893 (27 Stats., 612), the Cherokees ceded to the Government what was then known as the Cherokee Outlet. The lands ceded by the cessions above mentioned and those referred to constitute Oklahoma as it now exists.

Prior to the final settlement granting permission to the "whites" to secure "homesteads" or hold farms in this Territory, there were various attempts made to obtain forcible possession of the rich agricultural lands. United States troops on several occasions had to remove the intruders. In April 1879 and in February 1880 President Hayes issued proclamations ordering the intruders from the land and directing their removal by military power if necessary. In 1884 the would-be-settlers became more persistent and organized themselves into an armed body prepared to resist removal. They surrendered to the Government forces in January 1885. The next year Congress authorized the President to begin negotiations with the Indians for the purchase of lands, with results as has been stated.

The crop failure the first year after organization was a check to Oklahoma. Congress sent aid and the railroads loaned to the settlers, with-



1. Birdseye View of Oklahoma City.
2. Interior View of Overholser's Opera House, Oklahoma City.

Non

out interest, 25,000 bushels of seed wheat. The cession and purchase of the different tracts of land added to the Territory, have already been mentioned. Greer County in the southwest, which had been in dispute between the Federal Government and Texas, was added to Oklahoma in 1896. The Kiowa, Comanche, and Apache and Wichita reservations, were opened for settlement in July 1901. The Fort Sill Military Reservation, 60,000 acres, is southeast of the Wichita Mountains and in Comanche County. The Oklahoma Territory was created 2 March 1890, and 27 August of the same year the first legislature met in Guthrie. In 1891 Congress was petitioned to admit Oklahoma as a State. In 1903 another attempt was made to obtain Statehood. Oklahoma has had seven governors, two of whom were re-elected (1 Jan. 1904).

Consult: U. S. Government surveys and documents referring to the purchase of Oklahoma.

Oklahoma, University of, the Territorial University opened in 1892 at Norman. Its departments include the (1) College of Arts and Sciences, which offers beside the regular collegiate courses, a combined collegiate and medical course and collegiate and engineering course; (2) the School of Pharmacy; (3) the School of Fine Arts; (4) the preparatory department. The collegiate department confers two bachelor degrees, A.B. and B.S. The university is coeducational, and women are members of the faculty. It is supported mainly from the income of lands reserved and an annual territorial tax; tuition is free to residents of Oklahoma and Indian territories; in 1903 the income amounted to $60,400. The students in attendance that year numbered 400, and the faculty 30.

Oklahoma City, Okla., county-seat of Oklahoma County; on the North Fork of the Canadian River, and on the Atchison, T. & S. F., the Choctaw, O. & G., the St. Louis & S. F., the Oklahoma City & W., the Missouri, K. & O., the Texas & O., Oklahoma Terminal, and Oklahoma City & N. I. R.R.'s; about 30 miles south of Guthrie. It was settled 22 April 1889 by 3,000 men who came on railroad trains and on horseback from the territory line, after noon on 22 April 1889, when, by proclamation, the country was declared opened to settlement. It was incorporated July 1890 and chartered as a city April 1891. It is the commercial and industrial centre of a productive agricultural and stock-raising region. It has a large number of wholesale houses which 1 Jan. 1904 had 1,500 employees. The chief manufacturing establishments are cotton mills, flour mills, breweries, box and cracker factories, patent medicine factories, iron works, soap factories, woodwork shops, and others having in all 1,250 employees. The railroads have 1,100 employees who are residents of the city. It has an extensive trade as it is the distributing centre for a large region; and the grain, cotton, and live-stock of the surrounding country is mostly shipped from Oklahoma City to eastern and southern markets. It is the seat of the Epworth University, Sisters of Mercy College for Girls, and the Oklahoma Military Institute. It has public and parish schools, and a Carnegie Free Public Library. There are a number of good church buildings, the Sacred Heart Abbey, and Saint Anthony's Hospital. The eight banks have a combined capital of $750,000. The government is vested in a mayor and a council of 10 members elected every two years. The city owns and operates the waterworks. The population is nearly all American-born white people, about 2 per cent are negroes and 3 per cent Indians. Pop. (1890) 4,151; (1900) 10,037; (1903) 30,000.

E. E. BROWN,
Editor 'Times-Journal.'

Oklahoma Agricultural and Mechanical College, founded in 1891 at Stillwater. Its regular courses, for completion of which the degree of B.S. is conferred, include general science and literature, agriculture, mechanical engineering, chemistry, and biology; shorter courses are offered in agriculture, horticulture, mechanic arts, printing, and stenography and typewriting; there is also a preparatory department with a two-years' course. Women are admitted to the college, and there are also women on the faculty. The college receives the greater proportion of its income from the Federal appropriation provided for by the law of 1890, and from territorial appropriation; tuition is free. In 1902 the income amounted to $35,570; the students numbered 304, of whom 135 were women, and the faculty numbered 20.

Oklawha ("crooked water"), a river in Florida which has its rise in the central part of the State, flows almost due north for about 80 miles, turns abruptly, and flows east into the St. John about 20 miles south of Palatka. The country through which the river flows is so flat that the waters spread out into the forests on either side. It is about 200 miles long.

Ok'ra, a vegetable, the "gumbo" of Louisiana, and the "gombo" of France (*Hibiscus esculentus*). It is a native of the West Indies, but flourishes in all tropical and sub-tropical countries and is common in the United States, where its pods are employed green as an esculent. Its mucilaginous pods are used in Louisiana to thicken the soup called chicken-gumbo. During the Civil War the seeds were utilized in the South as a substitute for coffee. A few years ago the fibre from the okra stalks was tried as a substitute for jute in the manufacture of cotton bagging, but it was demonstrated that the culture of okra for its fibre could not be made a paying industry in this country. In India the fibre has been used in a small way for the manufacture of rope, twine, sacking and paper. It is less than half as strong as common hemp and is inferior to jute. Consult authorities mentioned under FIBRE, especially 'Report No. 6,' Office of Fibre Investigations, U. S. Department of Agriculture. See HIBISCUS.

Okubo, ō'k'oo-bō, **Toshimichi,** Japanese statesman: b. Province of Satsuma 1830; d. Tokyo 14 May 1878. He was early active in the opposition to the Tokugawa shogunate, and one of the most prominent leaders in the revolution of 1867–8 which resulted in the restoration of the emperor to power. From 1870–8 he was the most influential member of the cabinet, and always an advocate of progressive measures. He was a member of the embassy which visited the civilized nations of the world, in 1872–3; and in 1874 was sent as envoy extraordinary to China, and successfully settled the difficulty in regard to Formosa. In 1877 a rebellion broke

out among the Satsuma clan, but Okubo retained his position in the cabinet and assisted in suppressing this rebellion. He was killed in revenge by six members of the clan, when going to the imperial palace in Tokyo. A monument to his memory has been erected on the spot.

Okuma, ŏk'oo-mä, **Shigenobu,** Japanese statesman: b. ,province of Kiushiu, Hizen, 1837. Early in life he became an advocate of advanced reforms, the abolition of the feudal system, the restoration of the emperor to power, and a new system of education; and his persistent and courageous advocacy of these reforms was influential in bringing about the revolution of 1867–8. After the reorganization of the Japanese government he was appointed to a position in the foreign office, and in 1872 was made minister of finance, in which position he brought the national finances into order and established a national currency. In 1881 he withdrew from office and organized the Progressist party, which urged that a constitutional government be immediately organized, and that the ministry be subordinated to the parliament, of which he was the recognized leader during his political career. After the Japanese parliament was established, he became minister of foreign affairs, but his liberal attitude toward the revision of the treaties with foreign countries aroused so much popular opposition that he retired from office. In 1896 he was for a short time in the cabinet, and in 1898 organized a cabinet of which he was premier, but resigned within a few months and retired from public life. After his withdrawal from office in 1881, he founded the Semmon-Galko, a school for the study of law, literature, and political economy; and he has always been an advocate of the higher education of women.

Olaf, ō'läf, **Saint,** Norwegian king: b. 995; d. Sticklestad, Norway, 1030. He was a great-grandson of Harald Haarfager, a son of Harald, chief of the district of Gränland, and early made himself famous by his military expeditions to England, successfully assisting King Ethelred against the incursions of the Danes. After the death of Eric and the expulsion of his son, Olaf caused himself to be proclaimed king. He began his reign by introducing a special court of law called the Hirdskra, and restored the ancient boundaries of Norway and Sweden, but above all was a zealous supporter of Christianity and may indeed be called the real converter of Norway. The severity which he employed for this purpose afterward exposed him to a formidable retaliation at the hands of his own subjects. Having engaged in war with Canute the Great, king of England, he allied himself with King James of Sweden, but was so completely defeated in battle that he fled to Sweden and Russia. In 1028 he was induced by a dream to return to Norway, where he found the people so alienated from him that he could only bring 3,000 m n into the field to oppose the forces of the mighty Canute. The armies met at Sticklestad, near Drontheim, in 1030, and Olaf lost both the battle and his life. His body was buried in the cathedral of Drontheim, and he has since 1164 been honored as the patron saint of Norway. Many legends respecting him are current throughout the North, and his name has been given to an order of knighthood founded by King Oscar I. in 1841 as a reward for services to king and country, art and science. Consult Longfellow's poem, 'The Saga of King Olaf' (1863). His feast day is 29 July.

Öland, ė'länd, or **Oeland,** Sweden, an island off the east coast, in the Baltic, separated from the mainland by Kalmar Sound, from 3 to 10 miles wide. It is 85 miles long with an average breadth of four miles, and a maximum of 10. It is well-wooded, and has much land devoted to agriculture and pasture; the chief products are cereals, flax, cattle, fish, building stone, lime, alum, and cement. There are various villages besides the chief community Borgholm (pop. 1900, 926) which ranks as a town, has interesting ruins of a celebrated castle, and is becoming a summer sea-side resort. Pop. (1900) 30,408.

Olathe, ō-lā'thē, Kan., city, county-seat of Johnson County; on the Atchison, T. & S. F., the St. Louis & S. F., and the Missouri, K. & T. R.R.'s; about 20 miles southwest of Kansas City. It is in an agricultural and stock-raising region. The chief manufactures are flour, furniture, shoes, brick, and agricultural implements The State institution for the Deaf and Dumb is located here. The city owns and operates the waterworks. Pop. (1890) 3,294; (1900) 3,451.

Olbers, ōl'bĕrs, **Heinrich Wilhelm Matthaus,** German astronomer: b. Arbergen, near Bremen, Germany, 11 Oct. 1758; d. Bremen, Germany, 2 March 1840. He was educated at Göttingen and practised medicine in Bremen with great success until his death. The study of astronomy, however, formed his ruling passion, and he invented a new method of defining the course of comets by means of three observations; the comet which bears his name was discovered by him, as were also the planets Pallas (1802) and Vesta (1807). His calculations and observations, published in the 'Astronomisches Jahrbuch' in 1782, 1829–33, are of great value and still in use.

Ol'cott, Henry Steel, American theosophist: b. Orange, N. J., 2 Aug. 1832. He was educated in the University of the City of New York and in 1858–60 was agricultural editor of the New York *Tribune*. In 1863–6 he was special commissioner in the United States War and Navy departments and was admitted to the bar in 1866. He was one of the founders in 1875 of the New York Theosophical Society, and is its president; he has edited the magazine 'Theosophist' since 1879, and in recognition of his services to Hindu philosophy has received the unique honor of the sacred thread of the Brahman caste. He has published: 'Sorgho and Umphee' (1857); 'People from the Other World' (1875); 'The Buddhist Catechism' (1882); 'Old Diary Leaves' (1895–1903); etc.

Old Abe, a nickname applied to Abraham Lincoln.

Old Age, Diseases of. The advent of age and the decline from the prime of life are characterized by certain physiological conditions which are due to pathological changes resulting from senility. These conditions may be reached in middle life, and are then premature. They may be postponed till the subject has reached a great age, and he may pass away without evi-

dence to the lay eye of their existence; but nevertheless they are present, and age itself is never a cause of death. Arteriosclerosis (see ARTERIES, DISEASES OF) is probably present in every case of old age. The senile kidney is very frequently a cause of death. Its tissues are altered, and its power to perform its functions is much diminished. It becomes accustomed to eliminating the decreased excretory substances which result from a generally lowered vitality, but it is unable to perform the added labor demanded during an attack of indigestion or of an ailment accompanied by fever. Bronchitis is frequent in the aged, and when prolonged is followed by emphysema. Chronic pneumonia is frequently found in the aged lung at necropsy. During digestive disorders or infective diseases of the urinary tract (commonly cystitis) fever frequently arises, and in such an event respiratory failure is prompt and dangerous. The aged heart fails to contract completely during systole, owing to weakness of its muscle, and circulatory disturbances result. In the aged death often occurs with the heart in the condition of asystole. The nerves functionate with diminished power. General sensibility for heat, cold, touch, and pain is lessened, and all the special senses, hearing, smelling, tasting, and seeing, are impaired. Muscular decay and increasing fragility of the bones invite accidents, and old persons sustain frequent fractures of bones. The fragments in these cases do not unite speedily, and often fail to knit at all. Aged patients bear very badly the enforced quiet necessary during repair of fracture of the thigh-bone, a common accident with such. They suffer at once from loss of sleep, impairment of appetite, marked muscular atrophy, and derangement of digestive and urinary organs. The perils that accompany these conditions are often seriously complicated by hypostatic pneumonia. The aged are unusually prone to attacks of gout and rheumatism, and these diseases are fairly intractable. They are also very susceptible to the infection of erysipelas. Attacks of grippe are accompanied with marked prostration, alarming organic weakness, and frequent heart-failure. While the bronchial and pulmonary implication in grippe in the aged is less severe, it is apt to remain. Typhoid fever of irregular type and with insidious invasion is a common cause of death in those of advanced age. Cancer of stomach or intestine is not uncommon. Arteriosclerosis, already mentioned, leads to rupture of arteries, and apoplexy from cerebral hemorrhage is not infrequent. As a lesion of gout, chronic endarteritis occurs in many instances with secondary cerebral softening.

The treatment of the diseased conditions of old age does not differ in many respects from that in younger subjects, except that supportive measures are more essential. Resistive power and recuperative effort are naturally much diminished, and the decreased functionating power of all organs must be considered. Much can be done to prevent the early approach of age. Probably the use of alcoholic beverages is the most frequent and potent cause. Alcohol should be avoided at every age. Moderate eating, especially after middle age has been reached; avoidance of sudden or violent physical exertion after the age of 60; avoiding stress and strain, bodily or mental; limiting emotional outbursts, especially those of anger and grief; wearing suitable clothing, adjusted to climatic conditions; and leading an out-of-door life, guarding against exposure — these are precautions which may baffle the advance of old age for many years.

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Old Age Pensions. See PENSIONS.

Old Bailey, London, England, a historic criminal court, prior to 1903 adjoining Newgate Prison, between Holborn Viaduct and Ludgate Hill, where now stands the Central Criminal Court. In the Old Bailey the surviving judges of Charles I. were tried after the Restoration, in 1660, and it witnessed also the trials of the patriot Lord William Russell in 1683, Jack Sheppard in 1724, Jonathan Wild in 1725, the poet Savage in 1727, Dr. Dodd in 1777, Bellingham, the assassin of the statesman Perceval, in 1812, the Cato Street conspirators in 1820.

Old Bay State, a name given to Massachusetts, whose shores are washed by Cape Cod Bay. Prior to the adoption of the United States Constitution Massachusetts was known as "the Colony of Massachusetts Bay."

Old Bullion, a name familiarly applied to Thomas Hart Benton (q.v.) because of his persistent defense of gold and silver currency.

Old Castile. See NEW CASTILE.

Old Catholics, religious denominations formed by certain seceding Roman Catholics in 1870, whose basis of belief and practice was declared to be the revival of the traditions of the Apostolic Church and the recognition, as authoritative, of the first seven œcumenical councils of the Church and none others.

The Cause of the Revolt.— An œcumenical council, commonly known as the Vatican, was convened at Rome and assembled 8 Dec. 1869, which included 49 cardinals, 9 patriarchs of the Eastern Church, 4 primates, 121 archbishops, 479 bishops, and 52 abbots and other monastic dignitaries. On 15 Jan. 1870 the number present had increased to 744, and by March to 764. When the object of the council was made known, the definition of papal infallibility, a protest was made, outside the council, by Dr. Döllinger, the most illustrious scholar of Roman Catholic Germany, supported by the French Minister Darn and the Austrian Von Buesh and a small party of bishops. Nevertheless the dogma was at length promulgated and received the assent of the Roman Catholic hierarchy throughout the world. Its terms were as follows:

"We teach and define . . . that the Roman pontiff, when he speaks *ex cathedra,* that is, when in discharge of his office of Pastor and Doctor of all Christians he defines, in virtue of his supreme apostolic authority, a doctrine of faith or morals to be held by the Universal Church, is endowed with the divine assistance promised to him in Blessed Peter, with that infallibility with which our divine Redeemer willed that the Church should be furnished in defining doctrine of faith or morals, and, therefore, that such definitions of the Roman pontiff are irreformable of themselves and not in virtue of the consent of the Church." This dogma was promulgated 18 July 1870.

The universities of Germany alone opposed

the new Vatican decree. Dr. Von Schulte, professor at Prague, was first to utter a written protest. At Nuremberg a vote of dissent was passed by a meeting of Roman Catholic professors and scholars in August 1870. "Father Hyacinthe" (M. Charles Loyson) issued his 'Appel aux Evèques Catholiques' denying that the decree was binding on the Church. The learned Dr. Döllinger set forth in a letter his reason for dissent as "a Christian, a theologian, an historical student, and a citizen." His excommunication was immediately proclaimed from all the pulpits of Munich. He was, however, supported by the professors of the University, and an address to the king, written in the same spirit of protest, received 12,000 Roman Catholic signatures. Finally an assembly of the dissentients was held at Munich the following September and was attended by 500 delegates from all quarters of Europe. The lectures of Reinkens delivered in 1871 made the issues plain to the world, and his arguments were echoed and enforced in the inaugural address delivered by Dr. Döllinger as rector of the University of Munich.

Constitution of the Old Catholic Church.— The movement gradually gained such momentum that organized action was forced upon its supporters. On 4 June 1873 Dr. Reinkens was consecrated their bishop at Rotterdam by the Jansenist Bishop Heydekamp of Deventer and, as the cause was spreading rapidly in Switzerland, a congress was held there and was attended by both English and American theologians (12–14 September). The election of Bishop Reinkens was recognized by the German government, and in the following year a synod and conference were held at Bonn. The results of these discussions were embodied in canons by which the clergy were allowed to marry, compulsory fasting and confessions were abolished, the vernacular was ordered to be used in public worship, and it was made permissible in the churches to administer the communion in both kinds to Anglicans. In Switzerland the Old Catholics, or as they there preferred to style themselves, Christian Catholics, chose Professor Herzog for their bishop and he was duly consecrated by Bishop Reinkens 18 Sept. 1876. The University of Bern elected an Old Catholic faculty and in 1890 there were 55 congregations under Bishop Herzog with some 50,000 lay members and 72 ministering clergymen. In Austria the Old Catholics organized themselves in 1888 and in 1900 were reported to number 16,000 souls. In France a Gallican Old Catholic movement was set on foot by Père Hyacinthe under the jurisdiction of the Arminian archbishop of Utrecht. The Old Catholics in Italy were led by Count Campello, those in Spain by Cabrera and in 1890 and 1892 there was an enthusiastic international Congress of Old Catholics in which the progress of the movement was said to show a marked advance. On the death of Bishop Reinkens in 1896, Vicar-General Theodor Weber was elected to take his place and consecrated in Bonn with a jurisdiction extending over the whole German Empire. In this large diocese, the whole of Germany, the Old Catholics number 61 priests (four of them retired and two holding professorates), and from 45,000 to 50,000 lay members; and are building numberless churches, parsonages, and seminaries. At Bonn and Essen they have founded hospitals and poorhouses. The Church has several organs, the chief of which are 'Deutscher Merkur,' published at Munich since 1870 and at Bonn since 1899; 'Alt-Katholisches Kirchenblatt,' founded in 1874. In Holland it is represented by 'Oud Katholik'; in Italy by 'Il Labaro'; in Spain by 'La Luz.' Its quarterly review of theology (a scientific and learned volume of essays and notes) is the 'Internationale Theologische Zeitschrift,' founded in 1893.

Consult: Goetz, 'Die geschichtliche Stellung und Ausgabe des deutschen Alt-Katholicismus' (1896); Mayor, 'Facts and Documents' (1875); and Mullinger ("Theodorus"), 'The New Reformation.'

Old Colony, a name applied to the southeast part of Massachusetts, the section occupied by the Plymouth Colony, and later given to the State.

Old Curiosity Shop, a novel by Charles Dickens which first appeared by weekly instalments in 'Master Humphrey's Clock' 1840–1. Little Nell, Dick Swiveller, Quilp, and The Marchioness are prominent members of the *dramatis personæ.*

Old Dominion, a name given to Virginia. In the original charters pertaining to the lands of Virginia, it was frequently called "the colony and dominion of Virginia." Massachusetts was given the name "Old Colony," and Virginia "Old Dominion."

Old-field Lark, a local name in the Southern States for the meadow-lark (q.v.).

Old Folks at Home, a famous Southern plantation song, written in 1850 by Stephen C. Foster (q.v.). The song realized some $15,000 for the author.

Old Forge, Pa., borough in Lackawanna County; on the Lackawanna River, and on the Lehigh Valley, the New York, S. & W., and the Delaware, L. & W. R.R.'s; about five miles southwest of Scranton. It was settled in 1830 and remained a part of the Old Forge township until 1899, when it was incorporated as a borough. It is in the anthracite coal region; a large number of the men and boys of the borough are engaged in coal-mining. The chief industries beside the mining and shipping of coal are glass-blowing, manufacturing silk goods, and making chemicals and fertilizers. It has a fine high school building and good grade schools. The government is administered by a burgess, who holds office three years, a borough council, and subordinate officials. Pop. (1900) 5,630.

Old Glory, a popular name for the flag of the United States. It was first applied in 1831 by William Driver, a sailing captain of Salem, Mass., who died at Nashville, Tenn., in 1886. Previous to the outbreak of hostilities between the North and South "Old Glory" was flung to the breeze every day from the window of Captain Driver's Nashville house, but when the conflict began the old flag had to be secreted. It was kept out of sight till General Nelson's wing of the Union army appeared in Nashville 27 Feb. 1862, when Captain Driver presented it to the general to be hoisted on the Capitol. It was run up, and Captain Driver himself did the hoisting. Its name and history soon became

familiar to all the soldiers in General Nelson's command.

Old Grimes, the hero of a popular humorous American ballad and song, by Albert Gorton Greene (q.v.). The title is an adaptation from one of the metrical tales by George Crabbe, but the personage described in the ballad is an exaggerated study of an eccentric New Englander who flourished in the earlier half of the 19th century.

Old Guard, The, a popular name applied to a body of French troops in the army of Napoleon I. The Guard consisted of five regiments; was distinguished for bravery, and at the battle of Waterloo made the final charge of the French army.

Old Hickory, an affectionate nickname given to Andrew Jackson (q.v.) by his militia troops, on account of his toughness and endurance of hardship. It seems to have been first conferred on occasion of his march back from Natchez in February 1813, when, after having sent him there to foil an expected British attempt on New Orleans, Secretary Armstrong ordered him to disband his men. Jackson in great wrath marched them home in a body, undergoing great discomforts on the way.

Old Hundred, a popular religious hymn tune adopted from a 15th century melody. The tune is found in the Flemish Psalter (1540) and in the Dutch Psalter (1561). In England it was originally sung to the 100th Psalm. Consult Fitzgerald, 'Stories of Famous Songs' (1897).

Old Ironsides, a name applied to the United States frigate Constitution (q.v.).

Old Kentucky Home, a famous plantation song, written and set to music by Stephen Collins Foster, in 1850.

Old Line State, a popular name for the State of Maryland, which in the early colonial days was the dividing line between the Crown land grants of William Penn and Lord Baltimore.

Old Man; Old Woman, ornamental and culinary herbs. See ARTEMISIA.

Old Man of the Mountain, a name given to a huge rock on Profile Mountain, in the Franconia Range, N. H. When viewed from certain positions it bears a marked resemblance to a man's face. The name is sometimes given to Profile Mountain.

Old Man of the Mountain. See MOHAMMEDANISM.

Old Man of the Sea, (1) frequently in Greek poetry, an epithet applied to Nereus. (2) In the 'Odyssey,' an epithet also of a sea-deity, Phorcys, or Phorcus. (3) In the 5th voyage of 'Sinbad the Sailor' in the 'Arabian Nights' Entertainments,' an old man, who, under pretense of being carried by Sinbad across a brook, fastened himself upon the latter's back and could not be dislodged. Sinbad finally made him intoxicated, threw him upon the ground, and broke his head with a stone. In a derived sense, the expression is often used of a bore, or of a burden that cannot be escaped.

Old Mortality, a novel by Sir Walter Scott published in 1816. It deals with the struggle between the Covenanters and the forces of the crown under Claverhouse (see GRAHAM, JOHN, VISCOUNT DUNDEE), about 1670. The title is the nickname given to Robert Paterson (q.v.), who bestowed years of care upon the gravestones of Covenanters.

Old Nick, popular sobriquet of the Devil, derived both from Saint Nicholas (Ger. Nicolaus, diminutive Nickel, often used of the Devil) and from Nekker (or Nikker), a Teutonic water-sprite whose appearance to sailors foreboded death and drowning. Old Harry, Old One, Old Scratch are other names similarly used.

Old North State, The, a name sometimes given to North Carolina.

Old Oaken Bucket, The, a poem by Samuel Woodworth (q.v.), an American poet, written in 1817 and first published as 'The Bucket.' The air to which it is set is an adaptation of the music of Moore's song 'Araby's Daughter.'

Old Orchard, Maine, town in York County; on the Atlantic Ocean, and on the Boston & Maine railroad; about 10 miles southwest of Portland. It is a famous summer resort, on account of its smooth ocean beach 12 miles long, where surf bathing is safe, and there are good opportunities for fishing. Deep-sea fishing is a favorite sport, but those who prefer still-water fishing go to Biddeford Pond nearby. The Methodist camp-meeting grounds are visited annally by a large number. Thirty-one years (1903) of evangelistic work is claimed for Old Orchard. It is becoming a summer convention place. In 1903 conventions were held here under the auspices of the Christian Workers' League, the Christian Alliance, and the Woman's Christian Temperance Union. There were held also in the month of August the same year, a Musical Festival, a White Cross Convention, and a Methodist Convention. The population is several thousand in the summer months, but the regular residents number about 1,000.

Old Point Comfort, Va., a famous watering place in Elizabeth City County; on the point of a small peninsula where Chesapeake Bay and Hampton Roads enter the Atlantic Ocean. It is near Fort Monroe and about five miles north of Norfolk. The climate is equable, the opportunities for bathing, fishing, and boating are excellent; the garrison at the Fort, and the cities of Norfolk and Portsmouth nearby all add to the attractions.

Old Probabilities, a popular nickname for the head director of the United States Weather Bureau; a personification of weather prophecies generally.

Old Put, a popular sobriquet bestowed upon the American general, Israel Putnam (q.v.).

Old Red Sandstone, in geology, a name loosely used by Hugh Miller (q.v.) in his 'The Old Red Sandstone' and 'Footprints of the Creator,' for the formation below the Carboniferous (q.v.); New Red Sandstone (q.v.) was by contrast used of similar strata above the Carboniferous system. Miller's books did much to draw the attention of scientists to this group of Palæozoic rocks, and the term became popular. In scientific usage it was soon ousted by 'Devonian' (q.v.), which as suggesting Devonshire the typical English locality is less misleading than Old Red Sandstone, inasmuch as these rocks

consist of other sandstones than red, for example, white, yellow and green, and of many beds of clay and limestone. The Devonshire rocks are not sandstone but chalk; the identity or similarity of geological genesis between the rocks of Devon and Miller's Scotch sandstones was proved by the similarity of fossil remains. In America the main groups falling under the head of the Devonian or Old Red Sandstone System are those styled by the New York Geological Survey, the Catskill, Chemung, Portage, Hamilton, Marcellus, Upper Helderberg, Schoharie and Oriskany groups (qq.v.).

Old Reliable, in the American Civil War, a nickname applied to Gen. George H. Thomas (q.v.).

Old Rowley, nickname of Charles II. of England, said to have been derived from the name of one of the king's famous racehorses, whence, also, a part of the Newmarket racecourse is known as "Rowley mile."

Old Squaw, or **Old Wife,** the long-tailed duck (*Clangula hiemalis*), a sea-duck present in the nesting season in all boreal regions, and visiting the United States in winter. It is blackish and whitish; head, neck and lower parts mostly white in winter; a patch of gray on the head; breast brownish black; bill black and orange; tail very long—a means of instant recognition of the drake. The tail of the female is short, and her plumage is mostly grayish brown. Gunners sometimes call the drake "old injun" and the female alone "old squaw"; also "south-southerly," etc. Most of the names are taken from its noisy habits, for it is almost continually calling, but its cries are musical. They are favorite with gunners more from the skill required in shooting them, on account of their swift flight and wary ways, than for excellence of flesh; they rarely present themselves for a shot except when they come into the bays and river mouths for food at sunrise, flying in long lines. They also occur on the Great Lakes.

Old Testament, The, the canonical books of the Scriptures which were composed and published before the Christian era.

Origin and Formation.— It is impossible to be very certain about the date of composition and the authorship of most of the books of the Old Testament, or the manner and time of bringing them together into the collection in which they now appear. Few of them contain any statement in regard to their authorship, which we can reasonably suppose to have been made by the author himself, so that, who he was, and when he lived, must, for the most part, be determined by the evidence to be found in the contents of the book itself, or by references to it contained in other Biblical books. When the formation of the collection now known as the Old Testament, began, how it was carried on, and when it was completed, are matters, no one of which can be determined with certainty. For more detailed statements on these points, see BIBLE, *Genesis of the Old Testament,* and *Canon of the Old Testament.*

Ancient Versions.— The most important Ancient Versions of the Old Testament are the Greek Versions (especially the Septuagint); the Aramaic Versions, called Targums; the Syriac Versions (especially the Peshitto); and the Latin Versions, especially the Vulgate of Jerome. For an account of these versions, see BIBLE, *Versions of the Old Testament.*

Literary Elements.— The Old Testament cannot be correctly understood or rightly used, unless regard is given to the different literary elements, or forms of literature, which it contains. There are to be found in it books which, for want of a better term, may be called historical works, as, for example, the books of Samuel and Kings. These, however, are not histories in the modern sense of this word, but are works of religion, in which the lessons of history are used to bring men into harmony with the will of God. There are also in the Old Testament poetical works, as, for example, the Psalms and the book of Job, which exhibit all the phenomena that characterize poetry in general. We find also, in its contents, works of a practical philosophy, as, for example, the books of Proverbs and Ecclesiastes, all of which have the form, and, in some measure, the substance of poetry. Another, and a large element, of its contents is to be found in the collections of the sermons, or discourses, of the prophets, which form the main part of the prophetical books, as, for example, the books of Amos and Isaiah.

Each of these different kinds of literature has a nature and characteristics of its own, and must be interpreted, if interpreted correctly, in harmony with its own peculiar form and characteristics. This is especially true of the poetical and prophetical portions of the Old Testament, concerning which, therefore, something more in detail will follow.

The Poetry of the Old Testament.— Under this head, it is proposed to consider simply the form in which the poetry of the Old Testament appears, that is, the Hebrew rhythm and the Hebrew verse.

All rhythm in language is due to the repetition of certain uniform measures marked by a certain regular and recurrent stress. Thus the rhythm of the classic languages was secured by the use of poetical feet. Feet were combinations of syllables, all of which, in the same kind of verse, occupied the same time in utterance, but differed in the number of syllables composing them. In the Hebrew rhythm, the place taken by feet in the classic languages was held by sentences. Thus a Hebrew rhythm consisted of sentences of the same, or nearly the same, length, but composed, each one, of different words. As an example of this Hebrew rhythm, may be cited Psalm xviii. 2:

Jehovah is my rock, and my fortress, and my deliverer;
My God, my rock, in whom I will take refuge;
My shield, and the horn of my salvation, my high tower.

(All quotations and citations in this article are made from the American Revision of 1901.)

It will be seen from this example, that the equality of length in the different sentences, which is the basis of the rhythm, is secured, as would be natural, by having each sentence express the same thought, although the common idea is expressed each time by other words. To all such rhythms is given the name of Parallelism. So that we may define a Parallelism in Hebrew poetry as a combination of sentences, all of which are of the same, or nearly the same, length, and each of which expresses, in some way or other, the same idea. Each of the sentences so combined is called a Member of the Parallelism.

Parallelisms are classified both according to the number of their members, and according to the manner in which the common idea is expressed in all the members. In the classification according to the number of members, parallelisms are either simple or compound, a simple parallelism having two members, and a compound parallelism three members. In the classification according to the manner in which the common idea is expressed, parallelisms are either synonymous, antithetic, or synthetic. A synonymous parallelism is one in which all the members express, each one, exactly the same idea, but with some change of words in each member. Such a parallelism appears in the simple parallelism of Psalm iii. 1:

Jehovah, how are mine adversaries increased!
Many are they that rise up against me.

An antithetic parallelism, which is always a simple parallelism, is one in which the common idea is expressed in one member positively, and in the other negatively. Such a parallelism is Psalm xxv. 3:

Yea, none that wait for thee shall be put to shame:
They shall be put to shame that deal treacherously without cause.

A synthetic parallelism is one in which the common idea is expressed in all the members in such a manner that, in each member, a different side, part, or element, of the common idea, is made prominent. Such a parallelism is the compound parallelism of Psalm xiv. 4:

Have all the workers of inquity no knowledge,
Who eat up my people as they eat bread,
And call not upon Jehovah?

Hebrew verse is sometimes constructed by using parallelisms of different kinds, or even of the same kind, in a continuous succession. But very frequently, instead of thus employing successive parallelisms, stanzas are used in the making of the Hebrew verse. A stanza is a combination of parallelisms, or of parallelisms and single members, which are called, when used in this way, odd members, in which each one of these constituent elements expresses the same general thought in the way in which each one of the members of a parallelism expresses the same idea, so that these elements are related to one another synonymously, antithetically, or synthetically. It is to be noted, however, that two odd members cannot immediately succeed each other in a stanza. But it is common to use the term stanza in a more general and somewhat inaccurate sense, and thus to denote by it any one of the structural divisions of Hebrew verse, whether the portion so indicated is really a stanza as defined above, or only a parallelism. In this sense of the term, it is both correct and necessary to say that, in our present editions of the Old Testament Scriptures, except in those cases in which the Masoretic division and accentuation of the Hebrew text are to be rejected as not correctly indicating the real structure of the verse, each Scripture verse in the poetical books and passages is a stanza. Among the different forms of the true stanza occurring in the Old Testament, we find stanzas consisting of two parallelisms, as, for example, Isaiah i. 3:

The ox knoweth his owner,
And the ass his master's crib;
But Israel doth not know,
My people doth not consider.

We find also stanzas of this kind which are so arranged, that the two first members of the parallelisms immediately follow each other, and then the two second members follow each other in immediate succession, as, for example, Deuteronomy xxii. 42:

I will make mine arrows drunk with blood,
And my sword shall devour flesh;
With the blood of the slain and the captives,
From the head of the leaders of the enemy.

The real meaning here is:

I will make mine arrows drunk with blood,
With the blood of the slain and the captives;
And my sword shall devour flesh
From the head of the leaders of the enemy.

We also find stanzas consisting of two parallelisms and one odd member, as, for example, Hosea xiv. 9:

Who is wise, that he may understand these things?
Prudent, that he may know them?
For the ways of Jehovah are right,
And the just shall walk in them;
But the transgressors shall fall therein.

Other forms of the stanza also occur, which it is not necessary to specify in this place.

In addition to the rhythm of sentences which has now been described, the Hebrew verse has, according to some scholars, an accentual rhythm. Those who adopt this view, assert that every poem, or each portion of a poem, in which the rhythm remains the same, has the same number of accents in each member of every parallelism. It is, however, claimed that an irregular number of accents may occasionally occur in a member, especially if force or energy of thought is thus secured, just as irregular feet and lines are sometimes allowed in the classic poetry. The most weighty objection to this theory is the fact that, while it is, of necessity, founded upon the Masoretic accentuation of the Hebrew text, as this now exists, it requires frequent and considerable arbitrary changes of this accentuation in order to make the number of the accents conform to its claims. But it is not safe to accept as valid and sufficient the testimony of a witness who is in the next moment to be declared untrustworthy. It would seem better to think that the equality in the number of accents so often to be seen in the different members of a parallelism in the Hebrew text of the poetical portions of the Old Testament, is a coincidence due to the equality of length and the sameness of the thought in these members.

Some scholars have thought that, in addition to its rhythm of sentences, the Hebrew verse possesses a rhythm of quantity, and has, therefore, feet and metre in the same manner as the Greek and Latin verse. Various theories have been proposed in relation to this matter; but no one of them has yet been established in such a way as to meet with general acceptance among scholars. It is not too much to say that it is still a matter of doubt whether or not the Hebrew verse possesses a rhythm of quantity.

In some Hebrew verse, the stanzas are so combined as to form strophes. These are combinations of stanzas, including parallelisms used as stanzas, which are so constructed that each combination contains the same, or nearly the same, number of members, and forms the expression of a natural and important division of the thought of the poem. More frequently, when a poem has the strophic form, strophes constructed according to different standards

appear in it. But, in all such cases, the combination of the different kinds of strophes is made according to some definite plan and some mathematical law. Such a composite strophic structure may be seen in Psalm lvii., in which there are six strophes. The number of members in each of these strophes, and the plan according to which they are arranged, may be indicated by a line of figures, called a strophic scheme, in the following way: 4-5-6-4-5-6. The first strophe is a call for help, verse 1:

Be merciful unto me, O God, be merciful unto me;
For my soul taketh refuge in thee:
Yea, in the shadow of thy wings will I take refuge,
Until these calamities be overpast.

The second strophe is an expression of confidence that God will give the desired help, verses 2 and 3:

I will cry unto God Most High,
Unto God that performeth all things for me.
He will send from heaven, and save me,
When he that would swallow me up reproacheth;
God will send forth his lovingkindness and truth.

The third strophe sets forth the great need of help, verses 4 and 5:

My soul is among lions;
I lie among them that are set on fire:
Even the sons of men, whose teeth are spears and arrows,
And their tongue a sharp sword.
Be thou exalted, O God, above the heavens;
Let thy glory be above all the earth.

The fourth strophe sets forth the coming overthrow of the enemies of the poet, verse 6:

They have prepared a net for my steps;
My soul is bowed down:
They have digged a pit before me;
They are fallen into the midst thereof themselves.

The fifth strophe is an expression of gratitude to God for the help and deliverance which are surely to be given, verses 7 and 8:

My heart is fixed, O God, my heart is fixed:
I will sing, yea, I will sing praises.
Awake up, my glory;
Awake psaltery and harp:
I myself will awake right early.

The sixth strophe expresses the writer's joy because he can be sure of the goodness and faithfulness of God, verses 9–11:

I will give thanks unto thee, O Lord, among the peoples;
I will sing praises unto thee among the nations.
For thy lovingkindness is great unto the heavens,
And thy truth unto the skies.
Be thou exalted, O God, above the heavens;
Let thy glory be above all the earth.

Some writers use the term strophes, in speaking of Hebrew verse, to denote any portions of a poem which express natural divisions of its thought, without any regard to the number of the members contained in these portions of the verse. But such a use of the term seems to be faulty. For it means but little when so used, since almost every poem is strophic in this sense. Moreover, in such a use of the term, no sufficient account is made of the fact that there are some poems constructed, as already indicated, according to definite mathematical plans.

Some Hebrew verse has a choral form. That is, it consists of divisions intended to be sung responsively by different persons, either choirs or individuals. Such verse appears in Psalm xxiv., which seems to have been composed to be sung, or as if to be sung, at the removal of the ark by David from the house of Obed-edom to the fortress on Mount Zion. In this psalm, the choral structure seems to be the following:

(*The full choir, as the procession moves up the hill, verses* 1 *and* 2)

The earth is Jehovah's, and the fulness thereof;
The world, and they that dwell therein,
For he hath founded it upon the seas,
And established it upon the floods.

(*A single voice, or a part of the choir, asks, verse* 3)

Who shall ascend into the hill of Jehovah?
And who shall stand in his holy place?

(*A part of the choir replies, verses* 4 *and* 5)

He that hath clean hands, and a pure heart;
Who hath not lifted up his soul unto falsehood,
And hath not sworn deceitfully.
He shall receive a blessing from Jehovah,
And righteousness from the God of his salvation.

(*The full choir sings, verse* 6)

This the generation of them that seek after him,
That seek thy face, even Jacob.

(*The full choir before the gate of the fortress, verse* 7)

Lift up your heads, O ye gates;
And be ye lifted up, ye everlasting doors:
And the King of glory will come in.

(*A single voice, or a few singers, in the fortress, verse* 8, *a.*)

Who is the King of glory?

(*The full choir without the fortress, verses* 8, *b and* 9.)

Jehovah strong and mighty,
Jehovah mighty in battle.
Lift up your heads, O ye gates,
Yea, lift them up, ye everlasting doors:
And the King of glory will come in.

(*A single voice, or a few singers, in the fortress, verse* 10, *a.*)

Who is this King of glory?

(*The full choir without the fortress, verse* 10, *b.*)

Jehovah of hosts,
He is the King of glory.

Prophecy in the Old Testament.— In treating of Hebrew verse, we have described the one thing which is peculiar in the Old Testament in the matter of literary form. In the prophetical discourses, or sermons, of the Old Testament, we find the one thing which separates it as a book of religion from all other literature. The essential and distinguishing thing about the sermons and writings of the prophets was, that they were messages received directly from God, which were to be given to the men of the prophet's time for the purpose of changing, in some way or other, existing conditions in the national life. Hence, the prophetic discourses were always occasioned by a definite and actually existing historical situation. By them, the prophet sought to accomplish some result in the life and conduct of his hearers. Therefore, the motives he urged, and the truths he presented, were those naturally suited to secure the desired result. If he made predictions, he did so for the same reason that now causes preachers and ethical teachers to predict, that is, to show what consequences would follow certain lines of conduct in order to incite men to, or dissuade men from, some particular way of living. Prediction, therefore, was merely incidental, and not at all essential, to prophecy. Moreover, since the constant aim of the prophet was to secure some desired spiritual condition on the part of his hearers, and much that was predicted by the prophets, was only to come to pass in the future in consequence of the existence of this

desired spiritual condition, it follows that there was a very large conditional element present in all the predictions of the Old Testament prophets. The desired condition was not always in existence at the time to which the prediction related, and, consequently, there is much predictive prophecy which, so far at least as the letter of the prediction is concerned, has not yet been fulfilled, and cannot now ever be fulfilled. The Hebrew prophet was a preacher, and not a soothsayer, or a fortune-teller.

This fundamental law of prophecy is clearly set forth by the prophet Jeremiah, speaking in the name of Jehovah, in chapter xviii., verses 7–10, of his book. The word of Jehovah to him was:

> At what instant I shall speak concerning a nation, and concerning a kingdom, to pluck up and to break down and to destroy it; if that nation, concerning which I have spoken, turn from their evil, I will repent of the evil that I thought to do unto them. And at what instant I shall speak concerning a nation, and concerning a kingdom, to build and to plant it; if they do that which is evil in my sight, that they obey not my voice, then I will repent of the good, wherewith I said I would benefit them.

We may see an illustration of the working of this law in the case of the apparently positive and unconditional declaration of the prophet Jonah in regard to the fate of Nineveh. "Yet forty days," the prophet proclaimed, "and Nineveh shall be overthrown." But it was not overthrown; for

> "they turned from their evil way; and God repented of the evil which he said he would do unto them; and he did it not."

We find also a progressive element in the Old Testament prophecies. The same progressive character appears in this part of the divine revelation as is to be seen in revelation as a whole. The later prophets often presented some great fact in a higher and more complete way than those who had preceded them. If, for example, we study Psalm cx. and Isaiah ii. 2–4, in connection with each other, we shall find that they both present to us the fact that Jehovah, either in His own person, or in the person of the Messianic King, who shares His throne, and represents His authority, is to be the acknowledged lord and sovereign of the nations. But the two passages do not represent this fact as coming to pass in the same way. The first passage, Psalm cx. declares that this fact will come to be, because Jehovah will, in His wrath, by the exercise of His might, make the enemies of His appointed king a footstool for his feet, while the passage in Isaiah presents to us this same fact as resulting from the joyful submission of the nations to the rule of Jehovah on account of the high estimation which they will put upon His law. These two views are not necessarily mutually exclusive, or even inconsistent with each other; but the latter may reasonably be regarded as presenting the higher and more spiritual side of the one great fact.

The same progressive element may be noticed in those predictive passages which relate still more directly to the work of the Messiah. In the earlier days of Israel's history, when the kingdom was still in a more or less flourishing condition, the Messiah was generally presented, in the preaching of the prophets, as a great and victorious king. But, in the discourses of the prophets of the exile and the post-exilic period, the most common representation is that the Messiah will accomplish His work of salvation through humiliation and suffering. This, however, does not mean that the ideas relating to the character and work of the Messiah to be found in the writings of the prophets, were a natural growth, springing from the national consciousness in a purely human way, under the stimulation of the varying hopes and fears of the national history. They were not the less truths received from God, because, in giving them to men, He had regard to the ability of men to receive them. They did not cease to be revelation, because they were revealed according to a national receptivity conditioned by national circumstances.

Another element which appears not infrequently in the prophetic writings, is due to the fact that the prophets were often poets, and, like all poets, they set forth purely ideal creations of the imagination. Hence, we find sometimes in the prophetic predictions an ideal element, which could not have been expected by the prophet ever to be realized in actual experience or history. For example, it is clear that the prophet who spoke or wrote the words contained in Isaiah lii. 7–10, intended to predict that Jehovah would cause the city of Jerusalem to be rebuilt, and would bring back the exiles of Judah to their own land. In making this prediction, however, he tells us that a welcome messenger will be seen upon the hills near Jerusalem, bringing to the ruins of the city, and to some mysterious beings who will be seen watching over these ruins, the news of the speedy return of the people and the future rebuilding of the city. When these watchmen shall see Jehovah bringing back the nation to its own land, they will, the prophet declares, gaze into one another's face with gladness, and raise a song of joy. But we know from the account of the return from the Babylonian exile contained in the books of Ezra and Nehemiah, and also because of the natural possibilities of the case, that these events which are foretold in verses 7 and 8 of the passage in question, never actually occurred, and, indeed, never could have occurred. These events were, therefore, only creations of the prophet's imagination, ideal additions of a poetic nature to the facts of the case.

Old Testament Theology.—The teachings of the Hebrew prophets which are to be found in the Old Testament, and the other teachings of inspired men, which it contains, form the material from which is constructed the science of Old Testament theology. This science is a history as well as a science, and may be termed a historical science. The method of investigation and determination employed in it is the historic, but the results obtained by the historic method are classified according to their scientific theological relations. We may, therefore, define Old Testament theology as the science which consists of the inspired statements and teachings of the Old Testament that set forth facts and doctrines of revealed religion, classified according to their scientific theological relations, and presented so as to show their historic succession. Its aim is to show the progress of revelation by determining what inspired ideas and teachings belonged to its successive stages. This it does by exhibiting in their historic succession the religious ideas and teachings of each of the in-

spired authors and teachers of the Old Testament, and by showing what ideas of this kind belonged to each epoch in the nation's history. The definition, of course, assumes that there is a revealed religion, the facts of which are supernatural, and the truths of which have been made known to men by God. It also assumes that the Old Testament consists of inspired writings in which facts and truths of this kind are authoritatively and correctly stated by men who wrote and spoke as they were moved by the Spirit of God. It is necessary, therefore, according to this definition, to distinguish between Old Testament theology, and the history of the religion of Israel. The former is the history of revelation, the latter the history of religion. The former sets forth the things which were given to men from God, as the things they ought to believe and do; the latter tells us what were the religious beliefs and practices of the whole nation, in which beliefs and practices there was much, throughout the whole Old Testament age, which was common both to the Hebrew people and the other nations of the Semitic race. Even if all inspiration should be denied to the Old Testament writings, it would still be necessary to make this distinction between the history of the religion of Israel and Old Testament theology, in order to be scientifically accurate. For it would still be true that there is a great and striking difference between the religion of the great teachers of the nation, and the religion of the nation itself; and a scientific account of the religious faith and life of the people could not ignore this fact, or treat it as of little account.

As a historical science, Old Testament theology will depend, for the form in which its material will be arranged, upon the dates which may be assigned to the writings from which this material is derived. Even though this material remains absolutely unchanged in substance, yet each new theory about the dates of the books of the Old Testament will produce a new Old Testament theology. What any particular work on Old Testament theology shall be, will be determined in no small degree by the conclusions previously made by its author in the department of higher criticism. It is for this reason that no attempt is made in this article to present any particular scheme of Old Testament theology. It seems better, for the present, to indicate the true nature of the science, and to show how the final construction of it must be made, when at last this shall be possible. The religious teachings of each of the Old Testament books will naturally be given in the various articles relating to these books. The time has not yet come for constructing, from this material, a final Old Testament theology. When the dates of the Old Testament books and the order of events in the history of Israel have been finally determined, it will be possible to construct a final Old Testament theology by employing either one of two methods, each of which has its advantages and its disadvantages. One of these methods, which may be called the scientific method, gives special prominence to the scientific theological relations of the material. Taking, in their scientific order, each of the doctrines presented in the Old Testament, it sets forth the form in which this doctrine was taught in each of the different periods of the nation's history, and, so far as may seem desirable, in each of the books and writings of this period. The great advantage of this method is that it secures a clear view of the historical succession of the teaching in the case of each particular doctrine; but the principal disadvantage of using it is that we do not obtain by it a good idea of the whole body of the doctrines taught in any one period, or by any individual teacher. The other method, which may be called the historical method, gives special prominence to the historical relations of the material. It first determines what were all the religious teachings of each period of the nation's history, and, so far as may seem desirable, of each book and document produced in this period. Then it distributes these teachings into groups according to their scientific theological relations. The chief advantage of this method is that, by it, there is secured a clear view of the whole body of the teaching set forth in any particular period, or by any individual teacher; but its great disadvantage lies in the fact that it does not make very evident what was the historical succession of the teaching in the case of any particular doctrine.

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Oldcastle, ōld'kȧs-l, SIR **John,** LORD COBHAM, English nobleman: b. Herefordshire in the 14th century; d. London 25 Dec. 1417. He obtained his peerage by marrying the granddaughter of Lord Cobham. A zealous adherent of

Wickliffe, he collected and transcribed his works and distributed them among the people. In the reign of Henry IV., at the head of an English army in France, he obliged the Duke of Orleans to raise the siege of Paris. Under Henry V. he was accused of heresy, and not being able to satisfy his accusers he was condemned as a heretic, and committed to the Tower, but escaped. It was then reported to the king that 20,000 Lollards were to assemble at St. Giles' for his destruction, with Lord Cobham at their head. This accusation seems to have been credited by Henry, and there certainly was an abortive attempt at a Lollard rising, with which Oldcastle was probably connected. He avoided capture for a time, but at last was taken, and as a convicted heretic and traitor was "hung and burnt" in St. Giles' Fields. In later days he was represented as "the blessed martyr Lord Cobham," though, on the other hand, he figured as the boon companion of young Prince Henry, a roysterer and a coward. Hence his name was originally adopted by Shakespeare in his 'Henry IV.,' instead of that of Falstaff. The old play of Sir John Oldcastle (1600) adopts the favorable view of his character.

Oldenburg, Henry, ōl'dĕn-bėrg (Ger. ōl'dĕn-boorg), German writer and courtier: b. Bremen, Germany, about 1615; d. Greenwich, England, September 1677. He was graduated from the Gymnasium Illustre, Bremen, in 1639; sent as consul for Bremen to London and served in that capacity during the "Long Parliament" and Cromwell's Protectorate, and in addition to his diplomatic duties devoted much time to literature. He was one of the first members of the society organized in 1660 which later became the Royal Society and was a friend of Milton, Spinoza, Bayle, and many other leaders in the world of learning. He edited the 'Transactions' of the Royal Society (1664–77) and published numerous translations. Among them are: 'A Genuine Explication of the Book of the Revelation,' by A. B. Piganius (1671); 'The Life of the Duchess Mazarine'; etc.

Oldenburg, Germany, (1) a town, capital of the grand-duchy of the same name, 24 miles northwest of Bremen, on the Hunte, which here receives the Haaren, and forms a harbor. It has fine promenades on the site of the old fortifications, two grand-ducal palaces or residences, one of them containing a library of over 50,000 volumes; a handsome grand-ducal picture gallery; a modern town-house; a public library of about 110,000 volumes; a museum of Germanic and other antiquities, fine theatre, railway-station, gymnasium, commercial school, etc. There are manufactures of tobacco, glass, leather, soap, earthenware, musical instruments, etc., and important horse-markets. Pop. (1900) 26,635. (2) The grand-duchy of Oldenburg, comprising the duchy of Oldenburg, and the principalities of Birkenfeld and Lübeck, has an aggregate area of 2,479 square miles. It borders on the North Sea, and is surrounded east, south, and west by Hanover. In the Diet or Reichstag of the German Empire the duchy is represented by three deputies, and in the Bundesrath or Federal Council by one member. The ducal house of Oldenburg dates from the commencement of the 12th century, and among its branches are the kingly houses of Denmark and Greece. Pop. (1900) 318,434.

Oldfield, old'fēld, **Anne,** English actress: b. London, England, 1683; d. there 23 Oct. 1730. Her dramatic powers attracted the attention of Farquhar, the dramatist, and through his influence she made her appearance at Drury Lane. She soon overcame adverse criticism and rapidly rose to be the leading actress of her day. Her preference was for roles in plays of the "genteel comedy" order, but when finally persuaded to take tragic parts she is said to have startled even her fellow actors by her power. Though received in the highest social circles her private life furnished ground for censure as she openly lived with Arthur Mainwaring and after his death with General Charles Churchill. She was buried in Westminster Abbey with high honors. Her most famous rôles were: Lady Betty Modish in 'The Careless Husband'; Jane Shore; Cleopatra; Sophonisba; etc.

Oldham, ōld'ăm, **John,** American colonist: b. England 1600; d. Block Island, R. I., 1636. He came to Plymouth from England in 1623, but because of designs against the Plymouth government entertained by him with John Lyford, a Church of England clergyman, he was banished from the colony. He subsequently made his peace with the colonists and was of service to them on several occasions. Removing to the Massachusetts Bay Colony he settled in Watertown, which he represented in the first General Court. His murder by Indians on Block Island in 1636 was the chief incident leading to the Pequot War.

Oldham, England, a town in Lancashire, 6 miles northeast of Manchester. From an insignificant village in the 18th century, Oldham during the 19th century became one of the chief seats of the cotton industry, and an important coal-mining centre. Its numerous other industries include wool-weaving, hat-making, iron-founding, and the manufacture of engines, machines, gas-meters, etc. Although irregularly built on hilly ground and of no great architectural pretensions, Oldham is distinguished for its municipal enterprise and the administrative ownership of its various public utilities as gas, water, electric lighting plant, street railroads, etc. Pop. (1901) 137,238.

Oldha'mia, a genus of carboniferous brachiopods, known as fossils in the rocks of India and China. The name has also been applied in Great Britain to some remains of indeterminate character, probably of sea weeds.

Oldmixon, ōld'mĭk-sŏn, **John,** English political writer: b. Axbridge, Somerset, 1673; d. 1742. In his 'Essay on Criticism in Prose' (1728), he attacked Pope, who returned the compliment by abusing Oldmixon in the 'Dunciad.' He published also: 'The British Empire in America' (1708); 'A History of England' (1730–9); 'Memoirs of the Press' (1742); etc. He was distinguished for his hatred of the Stuart family.

Old'town, Maine, city in Penobscot County; on the Penobscot River, and on the Bangor & A. and the Maine C. R.R.'s; about 11 miles northeast of Bangor. It was settled in 1820, and was a part of Orono until 1840 when it was incorporated as a town, and was chartered as a city in 1891. It is in a lumber region, and the chief manufactures are wood products, machinery, and foundry products, pulp, boots and

shoes, woolen goods, and large quantities of lumber in different forms. Some of the prominent buildings are the Odd Fellows building, the city hall, and the high school. It has a free public library and a city hospital. The revised charter provides for a mayor and council elected annually. Pop. (1890) 5,312; (1900) 5,763. Consult Howard, 'History of Penobscot County.'

Ole Bull. See BULL, OLE BORNEMANN.

Olean, ō-lē-ăn′, N. Y., city in Cattaraugus County; on the Allegheny River at the mouth of Olean Creek, and on the Pennsylvania, the Erie, the Pittsburg, Shawmut & N. R.R.'s; about 68 miles in direct line south by east of Buffalo. It was settled in 1804 by Major Hoopo and David Heuston, was incorporated as a township in 1808, as a village in 1854, and was chartered as a city in 1893. It is in a fertile agricultural region, and near the Pennsylvania oil fields. In the vicinity is a mass of rocks of peculiar formation known as "Rock City." It is a distributing point for large quantities of petroleum which is brought by pipe lines from the oil fields south of the city, and considerable of it is sent by the same means to other cities. The lumber and leather interests are important. The chief manufacturing establishments are lumber mills, tanneries, oil-refineries, glass factories, machine shops, railroad shops, cooperages, wagon and carriage factories, brewery, brick yards, flour-mills, and furniture factories. The number of employees is about 3,000. It has a large trade in oil, lumber and lumber products, leather, and glass. It has a hospital, a State armory, a city park, and a driving park. The educational institutions are eight public schools, one parish school, a Commercial College, and the Foreman Library. There are about 20 church buildings; the Methodists and Roman Catholics have each three. The two banks have a combined capital of $225,000, and the total assets are over $4,000,000. The government is vested in a mayor, elected for two years, and 12 aldermen, six of whom are elected each year. Pop. (1890) 7,358; (1900) 9,462.

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Olean'der, a genus of shrubs (*Nerium*) of the order *Apocynaceæ*. The two or three species have narrow, leathery, evergreen leaves and terminal cymes of flowers, usually pink, followed by pods containing twisted seeds. The common oleander (*N. oleander*) is a native of subtropical and tropical Asia and of the Mediterranean region, whence it has been introduced into other warm countries as an ornamental shrub and hedge plant, and into greenhouses for growing in tubs. In the Bermudas it is so abundant that the landscape is perceptibly tinted by its bloom at some seasons. Otherwise the shrub seems to have few uses though charcoal from its soft light wood is used in Algeria for making gunpowder. The plants are easily grown from cuttings placed in water or in wet sand. They thrive best in rather moist soil, but will also do well upon high land if they obtain a good root-hold. The sweet-scented oleander (*N. odorum*), a native of Japan, India and Persia, is less sturdy than the common species, and is less cultivated.

Oleas'ter, or **Silverberry,** a shrub (*Elæagnus angustifolia*) of the order *Elæagnaceæ* (q.v.), an ornamental plant introduced from western Asia and southern Europe into temperate climates as an ornamental plant. It grows about 20 feet tall, is often spiny, has narrow light green leaves about two inches long, small, fragrant bell-shaped flowers, followed by yellow, oval silvery-scaly fruits. It seems to prefer well drained limy soils and sunny situations. It is very popular in cold climates, especially in the Dakotas and Minnesota, where it has proved hardy.

O'lefiant Gas. See ETHYLENE.

Oleic Acid, $C_{18}H_{34}O_2$, the most important member of the "oleic" series of acids occurs as the glyceride triolein, $C_3H_5(C_{18}H_{33}O_2)_3$, in most liquid and solid fats as olive, almond, and cod-liver oils, lard, tallow, etc., olive oil being about 72 per cent pure olein. To obtain the free acid the fat is saponified with alkali, the soap so formed dissolved in water and the fat acids liberated by the addition of dilute hydrochloric or sulphuric acids. This impure oleic acid is heated for a time with powdered lead oxide (litharge). The lead salts so obtained are extracted with ether which dissolves only the lead oleate. On acidifying the ethereal solution with dilute hydrochloric acid the lead is precipitated as lead chloride, leaving the pure oleic acid in solution from which it can be obtained by evaporation of the ether. The decomposition of triolein into oleic acid and glycerine may be accomplished by other means such as heating with superheated steam or with water and sulphuric acid. Oleic acid is a thin colorless oil at ordinary temperatures but solidifies when cooled to 4° C. (39° F.). Crystallizes from alcohol in silky needles melting at 14° C. (57° F.). Specific gravity at 19° C. (66° F.) is 0.897. It decomposes when heated to boiling at ordinary atmospheric pressure, but may be distilled unchanged under diminished pressure or with superheated steam. Insoluble in water, very soluble in alcohol, ether, and most other organic solvents. It is a monobasic acid forming many well defined salts, many of which are of use in the arts or in medicine. Sodium oleate is the chief constituent of castile soap; potassium oleate is found in soft soap; lead oleate is the "lead plaster" of the pharmacist. When well cooled oleic acid is treated with nitrogen trioxide it is changed to a solid isomeride, elaidic acid, which is used to some extent in making candles.

Olein. True olein is the glyceride of oleic acid. Composition, $C_3H_5(C_{18}H_{33}O_2)_3$. It occurs in most vegetable and animal fats, notably in olive oil, lard, and tallow. A colorless, odorless, nearly tasteless oil, insoluble in water, only slightly so in alcohol, soluble in ether. Alkalies saponify it to the alkali salt of oleic acid (soaps) and glycerine. Nitrogen trioxide changes it to its solid, isomeride elaidin. It is difficult to obtain it perfectly free from the glycerides of other acids occurring with it. The term "oleine" is applied to various commercial products, such as the liquid fats used by the soap-maker and the liquid fatty acids utilized by the candle manufacturer.

Olenek, ŏ-lyĕ-nyôk′, a river of northern Siberia, which rises between Mounts Boldisno and Dsholokon, and after a tortuous northeastern course of about 1,000 miles enters the Arctic Ocean 100 miles to the west of the Lena delta. It is six miles wide and 20 feet deep at its

mouth, on the left bank of which is the village of Ust Olenskoe.

Oleomargarine, a mixture of fats used as a substitute for butter. Oleomargarine was invented by a Frenchman, Mège-Mouries in 1870. His idea was to produce a substance very like butter in physical properties and chemical composition that would be more wholesome than and as cheap as poor butter. He used the best of beef-suet as a basis; 1,000 parts of well washed and finely chopped fat were digested at 45° C. (113° F.) with 300 parts of water, 1 part of carbonate of potash and two stomachs of sheep or pigs. After two hours the membranes had dissolved under the influence of the pepsin of the stomachs and the melted fat had risen to the surface. It was drawn off, salted and allowed to cool whereupon most of the stearin and palmatin crystallized out. This semi-solid mixture was subjected to hydraulic pressure and the fluid oleo 50–60 per cent pressed out. The oleo was churned with 10 per cent of its weight of milk together with a little butter color, and the product worked up like regular butter. Many changes have been made in the manufacture of oleomargarine since its invention by Mège-Mouries. The process given below as described by Armsby ('Science,' Vol. 7, pp. 471–472) is essentially the same as that described by Armour and Swift and is a fair representative of that followed in this country. From the beef-tallow is prepared the oleomargarine oil of Mège. The caul fat of freshly killed beeves is, after thorough washing first in tepid water and then in iced water, allowed to stand in a cold room until thoroughly cold. It is then rendered at a temperature between 130° and 175° F. The resulting oil is allowed to cool slowly until a considerable portion of the stearin and palmatin has crystallized out, and the pasty mass is then subjected to hydraulic pressure. The still fluid (about two thirds of the whole) flows out into a tank of cold water, where it solidifies into a granular mass which is known to the trade as "oleo" oil or simply "oleo." The name "oil" is somewhat misleading as the product is a granular solid of a slightly yellow color. Fresh leaf lard treated in substantially the same way as the beef tallow yields the "neutral lard" or "neutral" of the trade, also a granular solid of a white color.

The objects of this treatment are twofold, first, to produce fats as free as possible from taste or odor; second, to remove some of the difficultly fusible stearin and palmatin, in order that the finished product may melt readily in the mouth. Having thus secured the fats in the proper condition, the manufacturer proceeds to mix "oleo" and "neutral," the proportions varying according to the destination of the product; a warm climate calling for more "oleo," a cold one for more "neutral," and to flavor the mixture with butter. This flavoring is conducted in large steam-jacketed vessels provided with revolving paddles, by which their contents can be thoroughly agitated. Here the "oleo" and "neutral" are melted and thoroughly agitated with a certain proportion of milk, or sometimes of cream, and a proper amount of butter-color. Forty-eight gallons of milk to 2,000 pounds of product are stated to be a common proportion. After sufficient agitation, the melted mass is run into cold water and as it cools is broken up by paddles so as to granulate the mass. After thorough washing it is salted and worked exactly like butter. The product is known as oleomargarine. Although it contains hardly more than a trace of butter, the latter flavors the whole mass so strongly that when well salted, as it usually is, it might readily pass with an inexpert or careless consumer for rather flavorless butter. Oleomargarine is the cheapest product made. By adding to the material in the agitator or "churn" more or less pure butter what is known as butterine is produced, two grades of which are commonly sold, namely, "creamery butterine" containing more and "dairy butterine" containing less butter. Certain other substances such as cottonseed-oil, sesame oil sugar, glycerine, and glucose are used to some extent by a few, usually unimportant makers. On the question of the wholesomeness of artificial butter there is a wide difference of opinion, but most authorities say that a butter substitute carefully made from the fresh clean fat of healthy beeves or swine is wholesome.

The physical properties of oleomargarine are so similar to those of butter that it is very difficult to distinguish between them by any superficial test. For a good test that can be applied in the household, consult 'Farmers Bulletin' (No. 131) United States Dept. of Agriculture (to be obtained for the asking from the Secretary of Agriculture). The analytical chemist is able to detect oleomargarine by making use of the fact that it contains a large percentage of fatty acids not soluble in water and a lower percentage of those volatile with water vapor than butter does. There has been both Federal and State legislation regarding this substance. The Federal law of 1886 imposed a special tax on the manufacturer ($600 per annum), the wholesaler ($480) and the retailer ($48). In addition the manufacturer must sell it in stamped packages, the stamps making an extra tax of two cents a pound. The act of 1902 abolished this tax of two cents but established new rates, namely, 10 cents a pound on artificially colored oleomargarine, while oleomargarine free from any color that would cause it to look like butter was rated at one fourth of a cent a pound. The special taxes on the maker, etc., were not changed. Most States have an extra tax of their own. They vary widely and change frequently. Some merely add a few cents a pound, while others fix so high a rate or such conditions of manufacture or sale as to be practically prohibitory.

The production of oleomargarine in this country in 1888 was 34,325,527 pounds which increased to 126,316,427 pounds in 1902. Only about 3 to 4 per cent of it was exported. "Oleo oil," however, was exported in large quantity (161,651,413 pounds in 1901), more than half going to the Netherlands.

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Oleometer, ō-lẹ-ŏm'ĕ-tẹr, a species of hydrometer adapted for determining the relative densities of oils.

Oléron, ō-lā-rôṅ, France, an island in the Bay of Biscay, its nearest point two miles from the coast of the department of Charente-Inferieure, opposite Rochefort. It is 19 miles long by about five broad, and is very fertile. On it are the port of Le Château and the small towns of Saint Pierre d'Oléron and St. Georges d'Oléron. In history, the island is noted for the *Jugements ou Rôles d'Oléron* — Judgments or

Laws of Oléron, a code of maritime law compiled by command of Eleanor of Guienne before she married Henry II. of England, and modeled on the 'Book of the Consulate of the Sea' (a maritime code regulating commerce in the Levant). It was drawn up from the decisions of the maritime court of Oléron, in the duchy of Guienne, and was intended for the use of mariners in the Atlantic waters, was introduced into England in the end of the 12th century and into Flanders in the 13th. The usages and decisions upon which it was based were those observed in the wine and oil trade between Guienne and the ports of England, Normandy, and Flanders. The code formed the basis of modern maritime law. It was published for the first time in the 'Collections des Lois Maritimes' of M. Pardessus. An English translation was published as 'Rutter of the Sea.' See COMMERCIAL LAW.

Olevianus, ō-lē-vī-ā'nŭs (Ger. ō-lā-vē-ā'-noos), **Kasper,** German religious reformer: b. Treves 10 Aug. 1536; d. there 15 March 1587. He studied law in Paris, Orleans, and Bourges, where he became acquainted with the teachings of Calvin. Further theological learning was acquired by him in Geneva and he began to teach the Reformation doctrine in Treves in 1559, and to promote the spread of the new movement under the inspiration of Calvin. This roused the hostility of the archbishop, and the reformer was compelled to retire to Heidelberg, where he was appointed member of the church consistory, and court preacher. He now in collaboration with Ursinus produced the Heidelberg Catechism. His Lutheran sympathies led Louis VI. to depose him from his ecclesiastical preferments in 1576; and he went to Berleburg and thence in 1584 to Herborn, where he advocated the doctrines of the Reformation in the territories of Count von Wittgenstein and Nassau. His special contribution to the progress of the Reformation was of a practical and administrative character, and from him the Reformed churches received that Presbyterian type of organization and policy which has become permanent in Europe and America, where his method of government by synods has become universal. Consult: Harbaugh, 'Fathers of the German Reformed Church'; Hagenbach, 'Väter und Begründer der Reformierten Kirche' (1857).

Olfac'tory Nerve. See NOSE AND THROAT.

Ol'ga, Saint, a peasant girl taken to wife by the Grand-duke Igor of Kiev, who met her by chance when on a hunting party in Pskoff. She possessed remarkable talents and an exalted character. After her husband had lost his life in battle (945), she managed the government for his son, a minor. Then going to Constantinople, she was baptized by the Patriarch Theophilactes and took the name of Helena. After her death in 969 she was canonized by the Greek Church under her original name and her festival is kept on the 11th day of July (O. S.).

Ol'iban (more fully OLIBANUM), a gum-resin which flows from incisions in certain species of *Boswellia,* a genus of trees of the family *Burseraceæ,* noted for the production of aromatic gums, growing on bare rocks in the mountains of southern Asia and northeastern Africa. Olibanum is the *lebonah* of the Hebrews, *libanos* or *libanotos* of the Greeks, *thus* of the Romans, of all which terms the ordinary English translation is "frankincense" (q.v.). It is produced mainly or altogether by *B. serrata,* a large tree growing on dry and rocky ridges from Abyssinia and southern Arabia to northern India; but oliban comes principally from Somaliland (the best) and from Arabia. Aden is the chief point of collection, exporting from 1,500,000 to 2,000,000 pounds annually, much of which goes to India and China. The gum occurs in commerce in semi-transparent yellowish tears and masses; has a bitter nauseous taste; is hard, brittle, and capable of being pulverized; and diffuses a strong aromatic odor when burned. It was formerly used in medicine, but now is chiefly employed as incense in Roman Catholic churches and Indian temples. It contains 56 per cent of resin soluble in alcohol, 30 per cent of gum soluble in water, and from 4 to 8 per cent of an aromatic oil. Another species of *Boswellia* supplies in India an inferior gum of similar properties, used both as incense and as a substitute for pitch.

Olid, Cristóbal de, krēs-tō'bāl dā ō-lēd', Spanish soldier: b. about 1490; d. Naco, Honduras, 1524. He was brought up in the retinue of Diego Velazquez, governor of Cuba, who in 1518 sent him with a small force to find Grijalba, of whom nothing had been heard since his setting out for Yucatan. In Yucatan he met Cortez and was induced by him to desert Velazquez and join the other in his adventurous schemes, but in 1524 was captured and beheaded by one of Velazquez's kinsmen.

Oligar'chy. See GOVERNMENT.

Ol'igocene System, in geology, a name introduced by Beyrich (1855) for beds in North Germany, especially at Mainz, including portions of formations of the upper Eocene and the lower Miocene, and so forming a fourth subdivision of the Tertiary (q.v.), namely into Eocene, Miocene, Oligocene, and Pliocene. The rocks of the Oligocene are freshwater, brackish, or marine in origin and display a quasi-tropical flora; they occur in the Paris Basin, in Switzerland, where they are called Molasse, and rather rarely in North America, where the more important beds identified with the Oligocene occur in the Northwest Territory, North Dakota, along the White River, and from Florida to Texas, the last being styled the Vicksburg beds by Conrad and the Orbitoidic beds by Heilprin, who first called attention to the frequent occurrence in it of a fossil foraminifer, *Orbitoides mantelli.*

Ol"igochæ'ta, an order of chætopod annelids (see CHÆTOPODA) of which the earthworm (q.v.) is the most familiar example. The species are almost solely inhabitants of the earth or of fresh water, have the segments of the body similar, and differ from the marine chætopods (*Polychætæ,* q.v.) in their greater simplicity of structure, doubtless the result of degeneration. Thus they lack all appendages — cirri, palpi, tentacles, etc.— as well as parapodia, the bristles arising directly from the body-wall, either distributed regularly or arranged in four bunches on each segment. Usually eyes are lacking and there is no metamorphosis in development. These animals are hermaphroditic, and usually some of the segments are markedly glandular, forming a girdle (clitellum) which secretes the cocoon in which the eggs are laid. The group is divided into the aquatic or parasitic species (*Limicola* or *Microdrile*) and the terrestrial

forms (*Terricola* or *Macrodrile*). The aquatic species are mostly minute.

Ol'igoclase (Greek, "slight fracture"), one of the feldspar unisilicates, with the possible formula $(CaNa_2)_2Al_4Si_9O_{26}$. It crystallizes in the triclinic form; has a single clean fracture; is not affected by acids; varies in color from white to greenish; has a specific weight of 2.62–2.65 and a hardness of 6; occurs in granite and other early rocks in Switzerland, Germany, Sweden, and in the United States in New Hampshire, Connecticut, North Carolina, and elsewhere. A reddish variety with fine iron oxide crystals is used as a gem and is called sun stone.

O'lin, Stephen, American Methodist clergyman: b. Addison County, Vt., 7 March 1797; d. Middletown, Conn., 16 Aug. 1851. He was graduated at Middlebury College, Vt.; was appointed president of the Abbeville Seminary, S. C., and subsequently entered the ministry of the Methodist Episcopal Church. In 1828 he was appointed professor in Franklin College. In 1833 he was transferred to the Virginia conference, and elected president of Randolph Macon College. Later he spent some time in foreign travel, and in 1842 became president of Wesleyan University, Middletown, Conn. He was an impressive preacher, and a prominent advocate of the evangelical alliance. He wrote 'Travels in Egypt, Arabia Petræa, and the Holy Land' (1843), and 'Greece and the Golden Horn' (1854). Consult his 'Life and Letters' (1853).

Olinda, ō-lēn'dä, Brazil, a seaport town of Pernambuco, five miles north of the city of Pernambuco, which replaced it as the capital and commercial centre of the state, after the Dutch burned Olinda in the 17th century. Olinda was founded in 1535. Pop. 8,000.

Oliphant, ŏl'ĭ-fant, **Laurence,** English traveler and author: b. Cape Town, South Africa, 1829; d. Twickenham, near London, 23 Dec. 1888. He was the son of a chief justice of Ceylon, and after a boyhood spent in England went to Ceylon in 1841 and was subsequently private secretary to his father. Although later called to the bar he spent much of his time in travel, visiting the Crimea in 1852, and Canada and the United States (1853–4) as private secretary to Lord Elgin, and in 1855 he served under Omar Pasha in the Crimean war. The next year he joined Walker, the filibuster, at New Orleans, and was attached to Lord Elgin's China mission 1857–9. The year 1860 saw him with Garibaldi in Italy and the year after he was first secretary of legation at Yeddo, Japan, where he was wounded by assassins. He sat in Parliament for the Stirling Burghs 1865–7, but having by this time come under the influence of the mystic, Thomas Lake Harris (q.v.), he resigned his seat and entered the brotherhood which Harris had founded at Brocton, Chautauqua County, N. Y. At Brocton, under the orders of Harris, he was forced to do the hardest kind of farm labor, and there his mother joined him, but was not permitted to hold any confidential intercourse with him. Both mother and son gave up their private means to the community. In 1870 Oliphant returned to Europe and was *Times* correspondent during the Franco-Prussian war. In 1872 he married and the next year, with his wife and mother returned to Brocton. All three of the Oliphants were now the obedient slaves of Harris, and while his wife and mother were employed in menial duties Oliphant was called upon to engage in commercial enterprises for the good of the community. Husband and wife were presently separated by the command of the inexorable Harris, the wife being removed to a branch of the community in California. At last, in 1882, they emancipated themselves from the Harris influence, and after more wandering Oliphant finally settled at Haifa, in the Bay of Acre, and busied himself with schemes for assisting the Jews to return to Palestine. Although he had broken with Harris he still retained visionary beliefs not easy to define. In spite of his singular mysticism he was a shrewd man of business, a polished man of the world, and a writer of rare talents. That he was insane is hardly credible, though this is sometimes urged, but that he was more or less unbalanced is evident. Among his many books are: 'The Russian Shores of the Black Sea' (1853); 'The Tender Recollections of Irene McGillicuddy' (1878); 'Piccadilly,' a novel (1865); 'Altiora Peto' (1883); 'Episodes in a Life of Adventure' (1887); 'Haifa, or Life in Modern Palestine' (1887); 'Masollam' (1886). Consult 'Memoir of Laurence Oliphant and Alice, his Wife,' by Mrs. Margaret Oliphant (1891).

Oliphant, Margaret Oliphant Wilson, English novelist: b. Wallyford, near Musselburgh, Scotland, 4 April 1828; d. Wimbledon, Surrey, England, 25 June 1897. She removed with her parents to Liverpool in childhood and in 1852 was married to her cousin, Francis Wilson Oliphant, an artist in stained glass, who died in 1859. She began literary work early, publishing 'Passages in the Life of Mrs. Margaret Maitland' in 1849, and this was quickly followed by several other tales of Scottish life. After the death of her husband her family was supported entirely from the earnings of her pen, and during her long literary career she published 120 books and quite as many contributions to 'Blackwood's Magazine' in the shape of reviews, etc. Few women of her time have surpassed her in the amount of work accomplished and the even excellence of what she wrote. Of her many novels among the best are the five comprising 'The Chronicles of Carlingford' (1863–76)—of which 'Salem Chapel' (1863) and 'Miss Marjoribanks' (1866) are the most important,—'Within the Precincts' (1879); 'Harry Joscelyn' (1881); 'The Ladies Lindores' (1883); 'The Sorceress'; and 'The Cuckoo in the Nest' (1892). She was not a great novelist, for she lacked constructive power, and her plots are not always effective; but her careful and sympathetic analysis of character, her humor, pathos, invention, and naturalness entitle her to a high place among novelists of the second rank. Of several tales of the supernatural by her 'A Little Pilgrim in the Unseen' (1882), is the best known, but is surpassed in power by 'A Beleaguered City' (1880); and 'Old Lady Mary' (1884). In addition to her work in fiction she produced a large number of biographies and works of literary history, such as the 'Life of Edward Irving' (1862), a remarkable piece of sympathetic biography;

'The Makers of Florence' (1874); 'The Literary History of England 1790–1825' (1882). 'The Victorian Age of English Literature,' with her son F. R. Oliphant (1892); 'Historical Characters of the Reign of Queen Anne' (1894); 'Annals of a Publishing House' (1897); etc. In spite of much sorrow in her life her outlook upon existence was cheerful and tolerant, and her influence upon English fiction was wholesome in every respect. For a half century her admirable fictions were the delight of a wide circle of cultivated readers in this country and her own, and her 'Chronicles of Carlingford,' at least, have in them something of the same quality which renders Trollope's Dorsetshire tales so enduring. Consult 'Autobiography and Letters of Mrs. Oliphant' edited by H. Coghill (1899).

Olivarez, Gaspar de Guzman, gäs'pär dā gooth-män ō-lē-vä'rĕth, Spanish prime minister: b. Rome 6 Jan. 1587; d. Toro, Spain, 22 July 1645. He was educated at the University of Salamanca, was a gentleman of the bedchamber to the Prince of Asturias, and gained the favor of his royal master to such an extent that soon after the latter succeeded to the throne as Philip IV. Olivarez was appointed prime minister. For 22 years (1621–43) his power was almost unlimited. His sole object soon became the extortion of money from the people to supply the expenses of the war with Holland, France, and other powers. His severity occasioned revolts in Catalonia and Andalusia, and the Portuguese threw off the Spanish yoke, and acknowledged the Duke of Braganza king in 1640. The foreign wars were so fatal to Spain, whose armies were defeated by the French, and whose fleets were destroyed by the Dutch, that the king was compelled by universal public discontent to dismiss his minister.

Ol'ive, PRINCESS OF CUMBERLAND, title assumed in 1821 by Mrs. Olivia Serres: b. Warwick 3 April 1772; d. 21 Nov. 1834. Her maiden name was Wilmot; she married John Thomas Serres in 1791 and was separated from him in 1803. She wrote poetry and fiction and several pamphlets (1813–17) urging the claim of her uncle, James Wilmot, to be the author of 'Junius Letters.' In 1821 she was arrested for debt, and moved a stay as being daughter of the Duke of Cumberland. She asserted that £15,000 had been left her by George III., who recognized her as Cumberland's daughter, but she died without being able to see the King's will. Her claims were continued by her daughter Lavinia (1797–1871), who married Thomas Ryves, a portrait painter, was divorced from him in 1841, and in 1866 procured a verdict that her mother was not the daughter of the Duke of Cumberland. This *cause célèbre* was built upon most outrageous forgeries, but both Mrs. Serres and Mrs. Ryves succeeded in interesting Sir Gerald Noel and others in their pretensions.

Olive Thorne. See MILLER, HARRIET MANN.

Olive, one of the leading fruits of the world. It is borne by a small tree (*Olea europæa*) of the order *Oleaceæ,* and is the most important member of its genus, which includes between 30 and 40 species. This tree is a native of western Asia and probably of the Mediterranean region, and attains a height of about 25 feet, bears small lanceolate leaves and axillary racemes of fragrant yellowish-white flowers followed by oblong or ovoid fruits (drupes). From remote antiquity it has been cultivated as a food-plant, especially for the oil pressed from its fruits. Throughout the sub-tropical parts of the Old World the olive has been grown upon a commercial basis for many centuries, individual trees being known to be more than 1,000 years old. It was introduced during the 18th century into California, which is now the leading olive-producing district of the United States, but part of Arizona and New Mexico are adapted to olives and are gradually coming into notice. The assumption is made that seed was introduced in 1769 from Mexico and planted at the San Diego Mission, whence cuttings were taken to other missions throughout California; and this olive, the only one known in the State until about 1880, was called the "Mission" variety. Since 1880 numerous varieties have been introduced from olive-growing countries of Europe.

The olive succeeds best in warm dry climates. It will withstand some frost, but at blossoming time this is believed to impair if not to destroy the crop; and the same result is often attributed to high wind and very dry air at that time. A rich, well-drained soil is preferred, but the tree will succeed and produce excellent crops upon a very great variety of soils; it is usually a mistake, however, to plant it upon rocky hillsides, as too numerous failures in California prove. While not exacting as to food, the trees must have an adequate fertilizer. The return to the soil of the pomace after the oil has been expressed, together with slight dressings of commercial fertilizers and judicious cultivation, will keep the trees in lusty bearing condition. The trees are usually set about 30 feet apart either in hexagons or in squares, the former plan being preferred in California because it is more economical of land, and permits of plowing in three directions instead of only two. The land is kept cleanly cultivated throughout the season.

The olive is propagated by layers, suckers, sprouts, cuttings, tips of twigs, grafts, buds, and seeds. The last three, being tedious and slow, are rarely employed. The favorite method is by means of tips. These are obtained from small dormant branches, partly defoliated, rooted in moist sand and then transplanted in nursery rows. The trees should begin to bear when about eight years old and reach full productivity when about 30.

Olive Oil.—The principal uses of the olive are for oil production, for pickling, either green or ripe, and for drying. For the production of oil, the ripe fruits are carefully gathered by hand, bruised as little as possible and preferably crushed at once, otherwise they are partially dried in very thin layers through which air must circulate freely to avoid molding and fermenting, unsound fruit being prone to decay and impair the flavor and odor of the oil. An old practise was to crush the fruit by means of heavy mill-stones in pits, but the oil thus extracted from the kernels has been found to injure both the flavor and the keeping quality of the oil obtained from the pulp. Modern crushers, therefore, do not break the stones. The crushed pulp is then pressed in linen sheets, the pressure being applied very gradually. A

second pressing is made after the pulp has been mixed with cold water. Other pressings are sometimes given, each one resulting in a grade of oil inferior to the preceding. The two first grades are sometimes mixed. Since the separation of the oil from the juice by gravity is hazardous on account of liability to ferment, the impurities are washed out quickly by special apparatus in which a current of cool water comes in contact with a small quantity of the juice, mixes with it, separates the larger particles of pulp and allows the oil to rise through a tall column of water which further washes the oil-globules as they rise. After being allowed to stand for a time in a cool room this oil is racked off and sold as "new oil," or may be again allowed to stand for further clarification. Since the American market demands a clear oil, however, much of the domestic oil is filtered, a process which, especially if often repeated, impairs the flavor and makes the oil seem greasy. Throughout the process, scrupulous cleanliness is essential, because olive oil is prone to absorb any taint either in the utensils or in the air. The oil is pale yellow, inodorous, and has a specific gravity of .918 at a temperature of 15° C. It is largely used in cookery and pharmacy, for lubricating and illuminating purposes, and for making Castile and other kinds of soap, for which purpose the lower grades are most employed. In the United States it is often adulterated with cottonseed-oil. Gallipoli oil, which is used in dyeing, is made from the fermented fruit.

Olive oil also has important medical uses. In doses of from one to two ounces for adults, and one teaspoonful for infants, it acts as a laxative. It is also used in intussusception of the bowels; as an antidote in cases of acrid poisoning; as a local neutral protective from the atmosphere; in place of suet, lard, etc., as an inunction to increase the fat of the body, or to reduce the heat of the skin, and by workmen in lead factories as a laxative, and to prevent the absorption of lead. Combined with camphor, morphine, etc., it is applied to wounds, burns, and bruises, and forms the basis of many liniments. It is used to allay the pain of insect bites, and (warmed) in the ear, to destroy insects. It is also employed as an application to swollen breasts, as a lubricant of surgical instruments, sounds, pessaries, etc., and as an injection in cases of constipation; but for this last purpose it is inferior to castor oil. In large doses, it is believed by some physicians to hasten the discharge of gall-stones, sometimes apparently softening them.

Pickled Olives.— For pickling the fruits are gathered by hand before they are likely to become soft during the process, a degree of maturity not readily described except by saying that the time is just before the fruits would change from green to the mature fruit tint, which varies with the variety from yellow to almost black. They are first placed either in pure water, which must be changed each day, or in a weak solution of lye. This is to remove the bitterness and acridity and to soften the skin. After the latter process, which may occupy from one to three months, the lye is removed by soaking in pure water. Then the olives are subjected to a series of immersions in salt solutions of gradually increasing strength, the maximum being dense enough to float an egg. They will now keep for years if properly stored. Pickled green olives are much less a food than a table delicacy or relish; but pickled ripe olives, which are prepared by much the same process and are gaining in favor, are considered primarily as a food. Dried olives are popular in some Mediterranean countries, but are little known in the American market.

The average composition of pickled green olives is: water, 78.4; fat, 12.9; carbohydrates, 1.8; protein, ash, etc., 6.9; that of pickled ripe olives: water, 65.1; fat, 25.5; carbohydrates, 3.8; protein, ash, etc., 5.6.

Besides the species mentioned above, several other related species are valued more or less. *Olea chrysophylla,* a tropical African species, has been introduced into southern California, where it is planted for ornament, the under surfaces of the leaves being bright golden yellow. *Olea,* or *Osmanthus, fragrans,* is the fragrant olive of China and Japan, where its flowers are used for perfuming tea. It is also cultivated in greenhouses for its inconspicuous but exceedingly fragrant flowers.

In ancient Greece the olive was sacred to Pallas Athene and was a symbol of chastity and peace. Like the laurel it was used for making wreaths for crowning the victors in athletic sports.

Consult: Bailey, 'Cyclopedia of American Horticulture' (1900–2); Hayne, 'California Experiment Station Bulletin No. 129' (1900).

Olive-back, an American thrush (q.v.).

Olive-shell, the polished and often beautifully colored shell, of nearly the size and shape of an olive, of a marine gastropod mollusk (family *Olividæ*), allied to the volutes and cones, many species of which inhabit the warm seas, creeping about the bottom in search of animal food at considerable depths. The front of the foot is developed into a strong sort of fender, and fleshy flaps (mesopodium) are reflected laterally over the shell. An allied genus of smaller size is *Olivella,* one species of which has been used in the South Pacific islands as a kind of shell-money. Consult Cooke, 'Mollusca' (1895).

Ol'ivenite, natural hydrated arseniate of copper, occurring in most copper ores. It varies in color from brown to green; and in form from crystal, usually oblique tetrahedral prisms, the common form in the English copper mines, to amorphous, being then styled "wood copper" or "wood arseniate" because of its fibrous nature. Both forms occur in the Utah copper mines.

Ol'iver, Andrew, American colonial official: b. Boston 28 March 1706; d. there 3 March 1774. He was graduated at Harvard College in 1724, was elected to the general court, and became secretary of the province. When the Stamp Act was passed by the English Parliament, he made himself obnoxious by accepting the office of distributer of stamps, and on 14 Aug. 1765 was hanged in effigy from the "liberty tree." In the evening of the same day, the mob cut down the effigy and burned it in front of Oliver's house. Oliver was so much alarmed that the next day he publicly resigned his office. In 1771 he was appointed lieutenant-governor. He was a brother-in-law of Governor Hutchin-

son, and pursued the same public course, promoting, as far as possible, the designs of the British ministry. This was proved by his letters obtained by Franklin in England, and sent back to America in 1772. When, therefore, the general court petitioned the king for the removal of Hutchinson, Oliver's name was also included.

Oliver, Paul Ambrose, American military officer: b. on shipboard in the English Channel 18 July 1831. He was educated in Germany, and was engaged in business in the United States till the outbreak of the Civil War, when he entered the army as 2d lieutenant in the 12th New York Volunteers. He was in some of the hardest fighting of the War, and was brevetted brigadier-general of volunteers 13 March 1865. Since 1870 he has been a powder manufacturer near Wilkesbarre, Pa., and has there put to use machinery of his own invention to minimize the dangers of explosion.

Oliver, Peter, American jurist: b. Boston 26 March 1713; d. Birmingham, England, 13 Oct. 1791. He was a brother of Andrew Oliver (q.v.), and was graduated at Harvard College in 1730; held several offices in Plymouth County, Mass.; and in 1756 was appointed a justice of the superior court, although he had never become a lawyer. In 1771 he was made chief justice. Oliver was a Loyalist, and when, in 1774, the legislature ordered the judges to refuse a fixed salary from the king, he alone declined to comply, and was impeached in consequence. He wrote in favor of the British rule in a Loyalist publication called the 'Censor,' and went to England in 1776, when the British troops evacuated Boston. There he passed the remainder of his life. He possessed considerable literary skill, and was a collector of antiquarian materials.

Oliver Twist, a novel by Charles Dickens, published in 1838, the name of its principal character, a workhouse orphan, being the same as the title. There are nearly 20 other characters of typical significance. The abuses of the workhouse in which Oliver was born and where he passed his childhood, and the life of crime into which he was forced by the Artful Dodger and by Fagin in his training-school for thieves are described with the painful vividness of tragedy. But the characteristic humor of Dickens is present to relieve the diabolical villainy of Fagin, the brute ruffianism of Bill Sykes, and the degradation and wretchedness of the whole environment, Bumble, the self-important parish beadle, contributing freely to this mitigating element; while through Nancy, bound as she was in the same bundle of misery, the soul of good in things evil shines out to light the way to Oliver's deliverance.

Ol'ives, Mount of, or **Mount Ol'ivet,** the historic hill on the east side of Jerusalem, separated from the city by the valley of Jehoshaphat and the brook Kedron, and rising to a height of over 2,700 feet. It is celebrated as the scene of many biblical incidents especially in the ministry of Jesus Christ. It has four eminences extending from north to south, known respectively as Galilee or Viri Galilæi, Mount of Ascension, Prophets, and Mount of Offense. The northernmost of these derives the name by which it is known among Christians from the fact that it is supposed to be the hill on which two angels addressed the apostles after the Ascension, as "Ye men of Galilee." The next in order, proceeding southward, gets its name of Mount of Ascension from the supposition, originated by the Empress Helena, that this was the scene of our Lord's ascension, a supposition at variance with the narrative of Luke (xxiv. 50, 51), where it is said that Christ "led them out as far as to Bethany." This was the most important of all the eminences. At its foot lay the garden of Gethsemane. The next eminence southward is rather a portion of the previous one than a separate height, and is remarkable for containing a celebrated catacomb, known as the "Tombs of the Prophets" (perhaps in allusion to the words of Christ in Matt. xxiii. 29). The southernmost eminence is called the Mount of Offense, because it is supposed to be the "Mount of Corruption" on which Solomon erected the high places for strange gods (1 Kings xi. 7; 2 Kings xxiii. 13). On the hill is the small village of El Tour on the north of which is the Chapel of the Ascension belonging to the Mohammedans but used on festival occasions by Christians. On the east are several Russian buildings, including a handsome church, a hospice for pilgrims, and a tower from which a magnificent view is obtained, especially of the Dead Sea, Jordan Valley, etc. South of the village are the Paternoster Church, or Church of the Lord's Prayer, belonging to the Roman Catholics, and also a Carmelite convent. Modern olive trees represent the historical trees from which the mount derived its name, and which were cut down during the siege of Jerusalem 70 A.D. From the village of El Tour a road to the southeast leads to Bethany, passing Bethphage. Consult Rotthier, 'Ancient and Modern Palestine' (1898).

Olivet College, located at Olivet, Mich. It was founded in 1844 as Olivet Institute, and first chartered as a college in 1859. It is closely allied with and largely supported by the Congregational denomination, but is not under direct sectarian control. Besides the collegiate department, there is a preparatory department, and a school of music. A course in pedagogy is also offered. The college confers the one bachelor's degree of A.B. Women are admitted and number fully half of the student body. The campus contains 15 acres, and the grounds and buildings in 1902 were valued at $158,751; the library contained 28,000 volumes. In that year the students numbered 268, and the faculty 23.

Ol'ivetans. See ORDERS, RELIGIOUS, OF THE WORLD.

Ol'ivine, natural silicate of iron and magnesium ($Mg_2Fe_2SiO_4$), also called chrysolite, occurring in lava and as a principal constituent of basaltic rocks. It is possibly an original magnesian component of rocks now altered to serpentine. Olivine is transparent, olive green or brown, with a colorless streak and conchoidal fracture.

Olla Podrida, Sp. ōl'yä pō-drē'thä, a favorite dish of the Spaniards, consisting of various kinds of meat, vegetables, etc., cut up and stewed together. It is equivalent to the

French *pot pourri*. The words are often used metaphorically to denote a medley.

Ol'lendorf's System, an educational term applied to a 19th century method of learning languages, invented by H. G. Ollendorf (1803–65), and designed for those who teach themselves. The grammars are intended to give the students a mastery of the conversational forms of language, grammatical rules being few.

Ol'livant, Alfred, English soldier and author: b. 1874. Educated at Rugby and the Royal Military Academy at Woolwich, he received a commission in the Royal Artillery in 1893, but resigned in 1895 on account of injuries received from a fall and turned his attention to writing. His 'Owd Bob' and 'Danny' have been widely circulated in this country and his own.

Ollivier, ō-lē-vē-ā, **Olivier Emile,** French statesman: b. Marseilles 2 July 1825. He studied law and began the practice of his profession at Paris in 1848. Having taken part in the revolution of 1848, he was appointed commissary-general at Marseilles under the republic, afterward becoming prefect at Bouches-du-Rhône and then of Haute-Marne. In 1857 he entered the legislative assembly, where he became one of the leaders of the Liberal opposition and was one of "The Five" who were distinguished for eloquent and often successful opposition to the policy of Napoleon III. Gradually, however, he severed himself from his former political associates, and the severance was final when in January 1870, he accepted Napoleon's invitation to form a ministry. It was this ministry which declared war with Germany in July 1870, and was overthrown with disgrace in August 1870. Since then M. Ollivier has several times been a candidate for election to the Chamber of Deputies but without success. Beyond that he has taken no part in politics, but has devoted himself to writing works on legal and other subjects. These include 'Lamartine' (1874); 'Principes et Conduite' (1875); 'L'Eglise et l'Etat au Concile du Vatican' (1879); 'Thiers à l'Académie et dans l'Histoire' (1879); 'Le Concordat, est-il respecté' (1883); 'Nouveau Manuel de Droit Ecclésiastique Français' (1885); 'Michel-Ange' (1892); 'L'Empire Libéral' (3 vols., 1894–8), a defense of his career; 'Solutions Politiques et Sociales' (1894); and 'Marie-Madeleine, Récits de Jeunesse' (1896). In 1870 he was elected a member of the French Academy.

Olmedo, José Joaquin, hō-sā' hō-ä-kēn ōl-mā'thō, Ecuadorian poet: b. Guayaquil, Ecuador, 20 May 1781; d. there 19 Feb. 1847. He was educated in Quito and Lima, taught law for a time in the University of Lima and then practised in his native city. He engaged actively in public affairs, was vice-president of Ecuador and governor of the department of Guaymas, and in 1845 led a successful revolution against General Flores, but though he directed the provisional government he was defeated for the presidency. But his fame as a poet will outlast his political record, and few poets have been more widely read in South America than he. One of his best poems is a 'Song to Bolivar' (1826). His 'Collected Works' (Valparaiso, 1848; Paris, 1853; and Mexico, 1862) have been widely circulated. Consult: Herrera, 'Apuntes biograficos de D. J. J. Olmedo' (1887).

Olmstead (ŏm'stĕd or ŭm'sted) **Claim, The,** in American history, a celebrated case in admiralty law. Originally it was a case of capture on the high seas, and involved questions of prerogative regarding which the decisions of the Federal commissioners were set at naught by a State Court of Admiralty. One Olmstead and others, of Connecticut, being pressed into British service aboard the sloop Active in 1777, took possession of the sloop, and were in turn captured by Houston, commanding the Pennsylvania armed brig Convention. The Pennsylvania State Court of Admiralty awarded a large share of prize money to the State, and to the officers and crew of the Convention, and the owners, officers and crew of a privateer which assisted in the capture. Olmstead and others appealed to the Federal commissioners of appeals and received a favorable verdict. This the Pennsylvania State court set aside and deposited the moneys with David Rittenhouse, state treasurer. His executrixes were sued in 1802 before the newly organized United States Supreme Court, and judgment was executed in favor of Olmstead and others, in 1809, against violent opposition from Pennsylvania.

Olmsted, ŏm'stĕd or ŭm'stĕd, **Charles Sanford,** American Protestant Episcopal bishop: b. Olmstedville, N. Y., 8 Feb. 1853. He was educated at St. Stephen's College, Annandale, N. Y. and the General Theological Seminary, New York, and was ordained priest in 1877. He was subsequently rector of St. Asaph's Church, Bala, Pa., and in May 1902 was consecrated bishop of Colorado. He has published 'December Musings,' verse (1898); 'The Discipline of Perfection' (1902).

Olmsted, Charles Tyler, American Protestant Episcopal bishop: b. Cohoes, N. Y., 28 April 1842. He was graduated from Trinity College, Hartford, Conn., in 1865, and after studying for the ministry at St. Stephen's College, Annandale, N. Y., took orders, was assistant in Trinity parish, New York 1868–84; rector of Grace Church, Utica, N. Y., 1884–99; and vicar of St. Agnes Chapel, New York, 1899–1902. In October of the year last named he was consecrated bishop-coadjutor of the diocese of central New York.

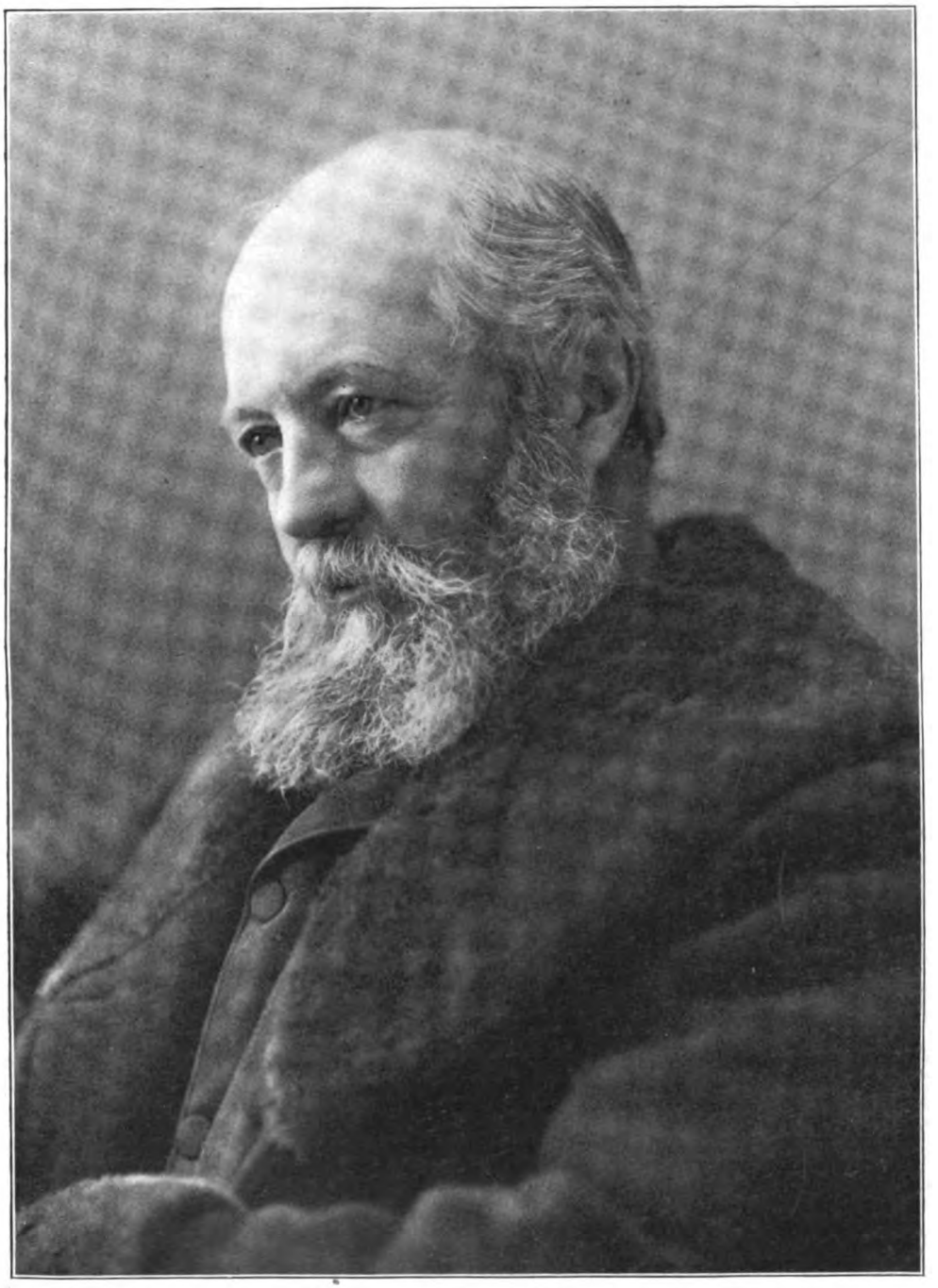
Olmsted, Frederick Law, American landscape architect: b. Hartford, Conn., 26 April 1822; d. Waverly, Mass., 28 Aug. 1903. He had some early instruction (1836–8) in civil engineering, went to sea, after a year before the mast studied agricultural science and engineering at Yale, and later was for seven years a farmer and horticulturist upon his own land. In 1850 he made a tour, largely on foot, of Great Britain and parts of the Continent, for the study of methods of agriculture and landscape gardening. In 1852–3, 1853–4, and 1856 he traveled in the South and Southwest, investigating the effects of slavery upon the economic and social condition of slave States. The results of his observations appeared in three successive volumes, 'A Journey in the Seaboard Slave States' (1856); 'A Journey in Texas' (1857); and 'A Journey in the Back Country' (1861). In 1861 a compiled work, based upon the three preceding, appeared in London as 'The Cotton Kingdom,' an account, says H. T. Tuckerman, "copious, specific, and authentic," which,

it is stated, was frequently quoted by such leaders of English opinion as favored the Northern viewpoint in the Civil War. In 1856 he again visited Europe, giving particular attention to parks; and three other trips were subsequently made. In 1855 the State legislature of New York passed an act for the construction of a large central park in New York city, and in 1857 Olmsted was made superintendent of the preparatory work. With Calvert Vaux (q.v.) he presented a plan for the park which was selected for the prize from 33 plans submitted in competition. Olmsted then became architect-in-chief, with Vaux as assistant, and despite political difficulties in four years practically completed the task. He employed at one time a working force of nearly 4,000 with a high degree of efficiency. In 1861 he was appointed by Lincoln to the United States Sanitary Commission, of which he became secretary and general manager. He displayed in this post great administrative ability. Besides conducting a necessarily large correspondence, he obtained legislation, visited the field, and prepared reports. He aided in the formation of the Union League Club, and was prominent in the organization of the Southern Famine Relief Association. In 1863 he resigned from the Commission and became first commissioner of the Yosemite National Park and the Mariposa Grove. He was in partnership with Vaux and Withers at New York in the practice of landscape architecture in 1865–72, was for a time president and treasurer of the New York park commission, and later for about six years was landscape architect to the commission. In 1878 he removed to Boston and there continued his professional practice. This was very large, and in the pursuit of it he visited every State in the Union, and eight times crossed the Continent. In 1895 he retired. A list of the public and semi-public grounds formed wholly or largely after his plans would be very extensive. It has been estimated that among the expressions of his art are more than 80 public parks, including prominently, besides Central Park, the Mount Morris, Riverside, and Morningside parks of New York; the Prospect and Washington parks of Brooklyn; the Washington and Jackson parks of Chicago; the Back Bay Fens of Boston, one of the most interesting domains of the kind in America; also in Boston, Leverett, Jamaica, Franklin, and Marine parks; Belle Isle Park of Detroit; the Cherokee, Shawnee, and Iroquois parks of Louisville; Delaware, South, and Cazenovia parks of Buffalo; Lake, West Side, and River parks of Milwaukee; and Washington Square in Baltimore. He laid out the grounds for the World's Columbian Exposition at Chicago in 1893, whose landscape features were so remarkable a success. He designed the general scheme for the preservation of the natural scenery at Niagara Falls. He planned the grounds of the Capitol at Washington, besides the marble terrace, and the grand staircase and other structures exterior to the building. Among his further works are designs for the grounds of numerous suburban land divisions, railway stations, schools, colleges, and private estates. It is somewhat difficult to express in concise form Olmsted's distinctive service to the landscape gardening of America. But it may perhaps be defined as having been the originating of the use of natural landscape resources, existing under urban or partially urban conditions toward the making of pleasure-grounds. He studied the genius of American scenery, and in the adaptation of his methods thereto made a real if unconspicuous contribution to the art of the United States. In his public parks he avoided the formal and the monumental as he had seen it in Italy and France, and combined system with wild nature in an unconventional result which is distinctive. It has been said that one of the secrets of his success was that he never endeavored to make unsuitable conditions conform to preconceived ideas, but made logical use of such conditions as they were. At the time of his death it was asserted with pardonable exaggeration, if exaggeration it were, that he had done more than any other of his generation to develop the æsthetic possibilities of the country. He was a founder of the Metropolitan Museum of Art, of the American Museum of Natural History, and of the New York State Charities Aid Association, of which for many years he was vice-president. In addition to the books above cited he wrote 'Walks and Talks of an American Farmer in England' (1852), frequently reprinted, and papers and reports on special problems of his profession. For an account of Olmsted's work on the Sanitary Commission, consult Stillé's history of that organization (1866).

Olmsted, Frederic Law, American landscape architect, son of the preceding: b. Staten Island 24 July 1870. He was graduated from Harvard in 1894 and studied landscape architecture under his father. Since 1898 he has been the landscape architect of the Metropolitan Park system of Boston, and of the Biltmore estate of G. W. Vanderbilt near Asheville, N. C., from 1896. He was an instructor in his profession at Harvard 1901–3, and became professor in the last named year. He has published 'Park System of the District of Columbia' (1902).

Olmsted, John Charles, American landscape architect, nephew of F. L. Olmsted (q.v.): b. Geneva, Switzerland, 14 Sept. 1852. He was graduated from the Sheffield Scientific School of Yale University in 1875 and studied landscape gardening under his uncle. With his partners he has designed parks in Cambridge, Mass., Hartford, Conn., Newport, R. I., and elsewhere, and with F. L. Olmsted since 1875 has designed many parks and private country seats.

Olmütz, öl'müts, Austria, a city of Moravia, 38 miles northeast of Brünn, on the March, which almost encircles it. Since 1886 the defensive works have given place to promenades and pleasure-grounds. It has a fine Gothic cathedral erected in 1306; one or two other interesting churches; a remarkably fine townhouse, the ancient residence of the archbishops; several good modern educational buildings, etc. Its industries and trade are unimportant. Olmütz is the see of an archbishop, and the seat of several courts and public offices. It formerly possessed a university, but this is now abolished except the theological faculty, connected with which is a library of 75,000 volumes. Olmütz was taken by the Swedes, under Torstensen, in 1642, in the Thirty Years' war. Frederick the Great besieged it for seven weeks in 1758 without success. The Conference of Olmütz was held here 28–29 Feb. 1850, between Russia and



FREDERICK LAW OLMSTED.

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Austria respecting the affairs of Germany and especially in reference to the revolts in Hesse and Schleswig-Holstein against their rulers, the Elector of Hesse and the King of Denmark. By the mediation of Russia, Schleswig-Holstein was given to Denmark, and the Elector of Hesse was reinstated. Pop. (1900) 21,933.

Olney, ŏl'nĭ, **Jesse,** American geographer and educator: b. Union, Conn., 12 Oct. 1798; d. Stratford, Conn., 31 July 1872. In 1828 he published 'A Geography and Atlas,' which was a standard work for 30 years, and effected a revolution in the methods of teaching geography. He taught school in New York State and Hartford, Conn., sat in the Connecticut legislature for ten terms and in 1867 became State comptroller. He published 'The National Preceptor' (1831); a series of text-books (1831–52), including a series of 'Readers,' a 'Common School Arithmetic,' a 'History of the United States,' and a volume of poems, 'Psalms of Life.'

Olney, Richard, American lawyer and politician: b. Oxford, Mass., 15 Sept. 1835. He was graduated from Brown University in 1856 and from the Harvard Law School in 1858. In 1859 he was admitted to the bar and practised law in Boston, being particularly successful as the chief counsel for the Boston & Maine and other railroads. In 1874 he was elected on the Democratic ticket to the Massachusetts legislature, but was not especially active in politics. In 1893 he was appointed attorney-general by President Cleveland, and was instrumental in breaking the railroad strike of 1894, by obtaining an injunction against the strikers from the United States circuit court of Illinois, enjoining them from interfering with interstate commerce and the United States mails. This injunction was enforced by the use of national troops, and was sustained by a decision of the Supreme Court, it being the first case of "government by injunction" (q.v.) in case of a strike. In 1895 he became secretary of state, in which position he had charge of negotiations with England in regard to the boundary dispute with Venezuela; and wrote a remarkable official note, sustaining the right of the United States to interfere and giving a wide interpretation to the Monroe Doctrine (q.v.). In 1896 he withdrew from the Democratic party on account of the free silver plank in the platform, but in 1900 he supported Mr. Bryan, publicly declaring his reason for so doing to be because he could not support the Republican policy in regard to the tariff, trusts, and imperialism. In 1903 he was prominently mentioned as Democratic presidential candidate in 1904.

Olney, Ill., city, county-seat of Richmond County; on the Illinois C., the Baltimore & O. S. W. R.R.'s; about 115 miles east of Saint Louis. It was settled in 1843. It is in an agricultural region. The chief manufactures are flour, brick, and tile, and dairy products. It has a large trade in its manufactures, and in hay, seeds, and fruits. It has a sanatorium and a free public library. The government is vested in a mayor, who holds office two years, and a council. Pop. (1890) 3,831; (1900) 4,260.

Olonetz, ō-lō-nĕts', Russia, a northern government bounded north and east by Archangel; southeast by Vologda, south by Novgorod, southwest by Saint Petersburg and Lake Ladoga, and west by Finland; area, 57,439 square miles. The administrative headquarters is Petrozavodsk. The surface of this government is generally flat; although in the northwest some hills occur, while part of the south is traversed by the ridge which forms the water-shed between the basins of the Baltic and the Volga. The most marked natural feature is the large number of lakes, streams, and morasses. The number of lakes — one of them, Onega, nearly 5,000 square miles in superficial extent — has been calculated at 1,500. The climate is rigorous. The winter is long, the summer heat, though of short duration, great. Timber constitutes an important part of the wealth of the government; porphyry and marble are extensively quarried between Lakes Ladoga and Onega; iron-ores and copper are worked; and hemp and flax thrive in many of the swampy districts. The chief means of support of the inhabitants are forestry, hunting, and fishing. The principal manufacture is that of leather. Education is very backward. Pop. (1897) 366,715.

Olssen, ŏl'sĕn, **William Whittington,** American Episcopal clergyman: b. New York 11 May 1827. He was graduated from Columbia in 1846 and from the General Theological Seminary in 1849, and entered the Episcopal ministry the next year. He was rector of St. James' Church, Scarsdale, N. Y., 1851–71; and from 1871 to 1901 held several professorships at St. Stephen's College, Annandale, N. Y., retiring in 1901. He published: 'Personality: Human and Divine' (1882); 'Revelation: Universal and Special' (1885); 'Sermons' (1903).

Olsson, ōl'sŏn, **Olof,** Swedish Lutheran clergyman and educator: b. Björtorp, Sweden, 31 March 1841; d. 1900. He was educated at the University of Upsala, entered the Lutheran ministry in 1863, and came to this country in 1869. He was professor of Augustana College, Rock Island, Ill., 1877–88, and after holding a pastorate at Woodhull, Ill., in the interior, returned to Augustana College in 1891 as its president. He edited two Swedish journals, and published 'At the Cross'; 'Greetings from Afar'; travels in England and Germany' (1880); 'The Christian Hope' (1887), works which have been translated into Swedish and Norwegian.

Olustee, ō-lŭs'tē, or **Ocean Pond, Battle of,** the most sanguinary battle of the Civil War in point of numbers. On 5 Feb. 1864 Gen Gillmore, commanding Department of the South, ordered Gen. Seymour to embark about 6,000 men in transports at Hilton Head and sail for Jacksonville, Fla. The transports were accompanied by five gunboats under command of Admiral Dahlgren. The objects of the expedition were to procure an outlet for cotton and lumber; to cut off one of the enemy's sources of commissary supplies, beef cattle; to obtain recruits for colored regiments; and to inaugurate measures for the speedy restoration of Florida to her allegiance to the Union, and to assist in the latter purpose, John Hay, President Lincoln's private secretary, was given a military commission and accompanied the expedition. Seymour arrived at Jacksonville on the 7th, dispersed a small guard, and occupied the place. On the afternoon of the 8th Col. Guy V. Henry, with cavalry and mounted infantry, moved out about eight miles, and late in the evening surprised about

350 cavalry, under Lieut.-Col. McCormick at Camp Finegan. They were about retiring as Henry charged them, who then followed, capturing four guns, with caissons. Henry reached Baldwin, 20 miles from Jacksonville, on the 9th, where he captured another gun, and a considerable quantity of cotton. Baldwin was at the junction of the two railroads from Jacksonville and Fernandina. On the 10th Henry advanced to Little Saint Mary's and encountered Maj. Harrison, with two companies of cavalry, and drove him with slight loss on either side, and then marched to Sanderson's, thence to within three miles of Lake City, where on the 11th he had a skirmish with the Confederates, and under Seymour's order fell back to Barber's at the South Fork of the Saint Mary's, where Seymour concentrated his entire command, and where he had received orders from Gillmore not to risk a repulse in advancing on Lake City, but to hold Sanderson's, unless there were reasons for falling back. Seymour was delayed for want of transportation, but on the morning of 20 February left his camp at Barber's with the intention of advancing on Lake City and, if successful, of destroying the railroad communication between east and west Florida at the Suwanee River. He had the mounted brigade of Col. Henry, the three infantry brigades of Cols. J. R. Hawley, W. B. Barton, and James Montgomery, and three batteries of artillery, in all about 5,500 men and 16 guns. When Seymour landed at Jacksonville, Gen. Joseph Finegan, the Confederate commander in east Florida, had an insignificant force to oppose to him, but by the 13th had collected at Lake City about 4,600 infantry, 600 cavalry, and three batteries of 12 guns. Col. C. Smith commanded the cavalry, and Gen. A. H. Colquitt and Col. G. P. Harrison the two infantry brigades. Thirteen miles east of Lake City Finegan threw up defensive works, a short distance east of Olustee station, crossing the railroad, the left near Ocean Pond, the right near a bay or jungle. Smith's cavalry, supported by two regiments of infantry, was sent to the front to skirmish with Seymour's advance and draw it on to the intrenched line. Col. Henry, with his mounted force, the 7th Connecticut infantry, and Elder's battery, led Seymour's advance, and after a march of 15 miles, about 3 P.M. came upon Smith's pickets. Two companies of the 7th Connecticut, of Hawley's brigade, were deployed as skirmishers, and drove them back upon their supports, which opened fire, Elder's battery was pushed forward and opened fire, the rest of the 7th Connecticut was deployed and developed the Confederate position, and Henry's cavalry was disposed on the flanks. The ground was favorable for the movement of troops. It was level and, although covered with pine timber, was free from underbrush. Colquitt, with three regiments of his brigade, had been sent forward to support Smith and take command at the front, and had quickly formed line with his infantry, sending the cavalry to the left. This was the line that the 7th Connecticut developed, upon which Seymour massed his artillery in the centre, and sent the 7th New Hampshire to turn the Confederate left, but the regiment got confused in its movement and, coming under a heavy and deadly fire, broke in disorder and was with difficulty rallied to take part in the action at a later hour. The 8th United States colored infantry became hotly engaged on the left, its commanding officer was mortally wounded, and more than half its men had fallen, when the remainder retreated in disorder. Colquitt's men advanced and delivered a very close and telling fire upon the artillery, shooting down men and horses, but were checked by the unremitting fire of the guns and by Barton's and Montgomery's brigades, now brought up, and under whose fire the left of the Confederate line began to fall back. Meanwhile Finegan had sent everything to reinforce Colquitt, and on both sides the entire forces, except the cavalry, were desperately engaged, the struggle continuing until dusk, when Seymour withdrew, abandoning his dead and many wounded, and five guns, whose horses had been shot. He was pursued about two miles that day, and withdrew in good order to Sanderson's and thence to the Saint Mary's and Jacksonville. The forces numbered about 5,100 on each side. The Union loss was 203 killed, 1,152 wounded, and 506 missing. The Confederate loss was 93 killed, 847 wounded, and 6 missing. Consult: 'Official Records,' Vol. XXXV.; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV. E. A. CARMAN.

Olympia, ō-lĭm'pĭ-a, a valley or plain lying in the middle of ancient Elis, in the western part of the Peloponnesus (Morea). Here were collected thousands of statues of the gods and of victors in the games, treasure-houses full of votive offerings, temples, altars, tombs, and in a word the most precious treasures of Grecian art. The elder Pliny states that in his time the statues were as many as 3,000 in number. Here also were preserved important public and private documents, treatises, and inscriptions of all kinds. The Altis (an old Elean form of *alsos,* a grove), in which were situated the Olympiēum or great temple of Zeus, containing the colossal statue of the god by Phidias, the Heræum or temple of Hera, the Metroum or temple of the mother of the gods, the treasuries of the different states which had sent votive offerings to the Olympian Zeus; the Prytaneum, in which the Olympic victors dined after the contests were finished; the Bouleuterion, in which all the regulations regarding the games were made, and other buildings and sacred objects, formed a quadrangle surrounded with walls, and having a length of about 1,800 feet and a breadth of 1,500; and the Exedra, a splendid building containing the reservoir of an aqueduct, erected by the Athenian orator and statesman Herodes Atticus, and furnished by him with statues of the families of the emperors Antoninus Pius and Marcus Aurelius, and by the Eleans out of gratitude to the builder with statues of the family of Atticus himself. On the north it was bordered by rocky but gently swelling hills, the most southern of which was called Mount Cronius, or the Hill of Kronos. On the south it extended almost to the river Alpheius, and on the west it stretched to the Cladeus, a tributary of the former. Outside the walls, but in the immediate neighborhood of the Altis, were the hippodrome, or race-course for chariots and for single horses; the stadium or foot-race course; a theatre, and a gymnasium. After being buried for ages under the soil washed down from the higher grounds, and conveyed by the inundations of the two streams between which it lies, the plain of Olympia has

again been brought to view by a series of excavations begun in 1875 by the German government at the instigation of Ernst Curtius, and continued till the spring of 1881. Nearly all the buildings above mentioned have been discovered, but unfortunately all in a much injured condition. Thousands of fragments of sculpture, bronzes, coins, terra-cottas, as well as numerous coins and inscriptions, are also among the discoveries. The originals are all to remain in the possession of Greece, but Germany bargained for the right to take the first casts from them, and a museum of Olympian casts and duplicates has been formed at Berlin.

Olympia, Wash., city, capital of the State of Washington, county-seat of Thurston County; on Budds Inlet at the mouth of Deschutes River, and on the Northern Pacific railroad. The inlet is at the head of Puget's Sound, and the city has steamer communication with Tacoma, Seattle, Victoria, and other places on the Sound and on the Pacific coast. It was settled in 1846 and chartered as a city in 1859, the year Washington was admitted as a State. It is the commercial centre of a region in which there are extensive lumber and agricultural interests, also fishing and to some extent mining. Large quantities of oysters are shipped from Olympia. Deschutes River has here several falls, three quite large, which in all have a descent of about 85 feet. The water-power contributes toward making Olympia a manufacturing city. The chief manufacturing establishments are lumber mills, salmon canneries, a brewery, iron works, machine shops, cooperages, and cold storage plants. It has an extensive trade in lumber and lumber products, and in farm products, fruits, its own manufactures, and oysters. The principal buildings are the State Capitol, built at a cost of $400,000, the county court-house, some of the bank buildings and business blocks. It has Saint Peter's Hospital (R.C.), Saint Amable Academy, public and parish schools, and the State Library, which contains nearly 30,000 volumes. Pop. (1890) 4,698; (1900) 3,863.

Olym'piad, in ancient Greece, the computation of time based on the period of four years between each celebration of the Olympic games (q.v.). The historian Timæus is said to have been the first to adopt this mode of reckoning time, and later Greek historians almost all followed his example. In reckoning by this era the year in which Corœbus gained the victory in the foot-race, corresponding to 776 B.C. of the Christian era, was taken as the first year of the first Olympiad. This mode of reckoning ceased when the games were abolished in 394 A.D., the second year of the 293d Olympiad. The interval between two Olympiads was four of our years, or a Greek *pentaëteris* of 48 moons and two intercalary months. To reduce from the Olympic to the Christian era, multiply the next number below the given Olympiad by four, and add the number of the year in the given Olympiad, if the sum is 776 or less, subtract it from 777, and the remainder is the year B.C.; if it is greater than 776, subtract that number from it, and the remainder is the year A.D.

Olym'pias, first wife of Philip II. of Macedon and mother of Alexander the Great; d. 316 B.C. She was put away by Philip so that he might marry Cleopatra, a niece of King Attalus. Olympias may have been cognizant of the plot against Philip's life which resulted in his death in 336. She played no part in politics during Alexander's rule, but about 319 regained a part in the government and acted so cruelly that she was besieged at Pydna by Cassander, who put her to death upon capturing the city.

Olym'pic Games, in ancient Greece, a general name given one of the four great national festivals. The games were usually celebrated on the plain of Olympia, and were sacred to the Olympian Zeus, who had a temple and statue there. The festival was a quadrennial one; the period elapsing between two celebrations was called an Olympiad. Their origin reaches back into a remote antiquity, prior to the commencement of the historical era in Greece, and by the Greeks themselves was attributed in various traditions to a divine source. The season of the year at which the games were held was about midsummer. In later times, when the contests were numerous, they lasted five days, and the fourth day of the festival was the day on which the first full moon after midsummer fell, and therefore, according to the Greek mode of dividing the year, the 14th day of the month. The games thus lasted from the 11th to the 15th inclusive. The number of the judges varied at different times, but ultimately was fixed at eight. Their decision was not final, but might be revised by the senate. Under the judges was a set of police called Alytæ, who kept order during the celebration of the games. None but Greeks of pure descent were allowed at any time to take part in the games, until the conquest of Greece by the Romans, when they also were admitted to the contests. If, however, a man could boast of pure Hellenic blood, it did not matter to what city he belonged, or whether he was rich or poor, he had in any case an equal right to be recognized as a competitor, provided he complied with the regulations of the judges. Barbarians were permitted to be spectators of the games, but slaves were not allowed even this privilege. Women also were entirely excluded, and were not even allowed to cross the Alpheus while the games were going on. For the first 13 Olympiads there was only one contest, a foot-race. In course of time the number of contests increased to 24, including shorter and longer foot-races, wrestling, boxing, chariot-racing, horse-racing, foot-racing in heavy armor, chariot-racing with mules, and games for boys corresponding to most of those in which men engaged. The prize awarded to the victor was merely a garland of wild olive, but the honor of gaining such a prize was so highly esteemed that a victor in the Olympic games was regarded as bringing glory not only to himself but to his family, and even the city or state to which he belonged. The victor received his crown standing on a table made of ivory and gold. His own name, and that of his father, and his native state, were proclaimed by a herald to the assembled multitudes. The celebration was concluded by religious ceremonies and processions, and by banquets in honor of the victors. On returning to his native city the victor was honored with a triumphal procession, and heard his praises celebrated in lyric verse, which was sometimes the production of the greatest poets of the time. In addition to this, special privileges

were usually conferred on them for life. A place of honor was allowed them in all public assemblies, statues were erected to them, and so forth. At Athens they were maintained for the rest of their life at the public cost.

Olym'pus, a mountain situated in Thessaly, at the eastern extremity of the range called the Cambunian Mountains. It is now generally called by the Greeks Elymbos or Olymbos. The Turks call it Semavat-Evi, the abode of the celestials. It rises to the height of 9,794 feet, being the highest mountain in Greece. The earliest Greeks looked upon it as the highest of all mountains, and as the central point of the earth's surface. The gods of Homer dwelt on its summit. In after times the gods were said to reside in the exterior sphere of the heavens, above the firmament, and this seat of the blessed received the name of Olympus. Hence the gods themselves were called Olympian gods, and, as such, formed a body of which Zeus was the head. The 12 great gods composed the council in Olympus, and the others the general assembly. They did not dwell together, but separate in several mansions built upon the different heights of the many-peaked Olympus. At the highest summit stood the palace of Zeus, where all assemblies and feasts were held. From thence he could look down upon the earth, fill the heavens with clouds, and hurl his thunderbolts.

Olynthus, ō-lĭn'thŭs, now **Ais Mamas,** Saloniki, Turkey, an ancient town of Chalcidice, Macedonia, at the head of the Toronaic Gulf, the modern Gulf of Cassandra. It was early inhabited by Greeks, was taken by the Persians under Artabazus, one of the generals of Xerxes, was next subject to Athens, and regained its independence when the Spartan general Brasidas extinguished the Athenian power in Chalcidice. From its excellent maritime position, it grew in wealth and importance, until, becoming too powerful, the Spartans captured it in 379 B.C. In 352 the Olynthians formed an alliance with the Athenians, which provoked the hostility of Philip of Macedon, and in 347 the city was betrayed to him, the citizens were enslaved, and every building was demolished.

Olyphant, ŏl'ĭ-fant, Pa., borough in Lackawanna County; on the Lackawanna River, and on the New York, O. & W. and the Delaware & H. R.R.'s.; about six miles above Scranton. It was settled in 1857 and incorporated in 1877. It is in the anthracite region, and its chief industries are connected with mining and shipping coal. It manufactures blasting powder, and has machine-shops and iron works. Its chief trade is in coal. The government is vested in a burgess, who holds office three years, and a council. The borough owns and operates the electric-light plant. Pop. (1890) 4,083; (1900) 6,180.

Om, ōm, a Sanskrit word to which the Hindu religion attaches peculiar sanctity. It is pronounced at the beginning and end of every lesson in the Veda, and is also the introductory word of the Puranas. In the Vedas it is said to comprehend all the gods.

Om Mani Padme Hum, ōm mā'nē päd'mē hoom, in the Buddhist religion, a sacred formula, known as the "formula of six syllables," used especially in Lamaism. Among the Tibetans and the Mongols it is repeated on all occasions, important and unimportant, and is found written on all sorts of objects on which inscriptions can be made. It is the first thing which a child learns to repeat. When written in the form of a monogram its sacred character is exalted. The formula is explained to mean either, "Oh, the jewel in the lotus: Amen"; or "Salvation in the jewel-lotus: Amen," referring to the deified saint Avalokites'wara or Padmapâni, the reputed author of the formula, who was believed to have been born from a lotus. In later times a mystical meaning was given to each of the six syllables composing the phrase.

Omaha, ō'ma-ha, Neb., the largest city in the State and county-seat of Douglas County, is situated on a sightly eminence on the west bank of the Missouri River, 600 miles from its confluence with the Mississippi. Although a superficial survey of the city had been made in June 1853 no attempts were made toward a permanent survey. The Indian title had not been extinguished, and the Indians were very tenacious of their rights, and viewed with suspicion all the movements of the white men.

History.—It was not until March 1854 that a treaty was concluded with the Otoes, Missouris and Omaha Indians, ratified 21 June, and promulgated 24 June, whereby the title of the Indians was surrendered, and left the land to be taken up and enjoyed by the white man. In the spring of 1854 some settlers arrived and the first building was erected. The first general election in the Territory was held 20 Dec. 1854, and on 16 Jan. 1855 the first Legislative Assembly was convened at Omaha, and on 24 January commenced a contest (which lasted for 12 years), when the member from Cass County gave notice that, at an early day, he would introduce a bill to locate the capital of Nebraska. The struggle was long and bitter, often at the expense of needed legislation, producing much ill feeling, and was more troublesome to manage than any question the Legislature had been called upon to decide. After a long debate upon the proposition of the member from Cass, the question was decided in favor of Omaha by a vote of 14 to 11 in the lower house, only to be renewed at every subsequent meeting of the Legislature, until Nebraska became a State, when the capital was removed to Lincoln. On 2 Feb. 1857, by an act of the Legislature, Omaha became an incorporated city, it having been up to this time a county organization, and an election was held on the first Monday in March in that year, when a mayor, nine aldermen and other city officers were elected. The council held its first session 6 March. Under the direction of the council the mayor proved up the claim of the city, east of the 6th principal meridian, and the same was surveyed and laid out into city lots, streets and alleys.

The discovery of gold in Colorado in 1858 made Omaha the best point for outfitting for the mines. The streets were filled with emigrants on the way to the gold fields, and daily trains left to cross the plains in search of gold. At the breaking out of the Civil War Omaha was made military headquarters, which greatly increased its business and importance. From the day that President Lincoln decided that the initial point of the Pacific Railroad should be "at

a point on the western boundary of Iowa, opposite section 10, township 15, north of range 13, east of the 6th principal meridian in the State of Nebraska," the success of Omaha was assured, and from a city of 320 blocks it has grown to one of 24 square miles.

Government.—The city is divided into nine wards, the Government being confided to a mayor, city council, composed of two aldermen from each ward, an advisory board of eight members, board of public works (three members), board of public health (four members), park commission (five members), and board of fire and police, with five members. The police department consists of a chief of police and 102 men. The fire department is under the charge of a chief and two assistants, and has four steam fire engines, three hook and ladders, eight hose companies and one water tower.

Public Parks.—The chief suburban attractions of the city are its parks, seven in number, which are connected by a boulevard system. Hanscom Park, the oldest, contains 60 acres. Riverview, in the bluffs overlooking the Missouri, contains 70 acres. Bemis Park contains 10 acres; Elmwood contains 215 acres; Miller Park, 80 acres, and Fontenelle Park, 110 acres. Prospect Hill Cemetery is located in the northwest part of the city on high and eligible ground. Forest Lawn is situated seven miles northwest of business centre of city; others are Mount Hope Cemetery, Jewish Cemetery, Bohemian, Ever-Green, Springwell, Holy Sepulchre, Saint Mary's and Cassidy's Roman Catholic Cemeteries.

Buildings.—The Douglas County Court House, a stone structure in Farnam Street, was completed in 1885 and is admirably adapted for the purpose for which it was erected. The cost of the building, land and furniture, was about $225,000. The Omaha *Bee* Building was completed in 1889, an imposing substantial building of stone and pressed brick, seven stories in height, covering an area of 132 square feet. The New York Life Insurance Co. Building, a ten story edifice of brick and stone, is one of the land marks of the city, and was erected at an expense of $1,000,000. The Paxton Block was completed in 1888 at a cost of $361,000; in the same year the Barker Block and Granit Block were erected at a cost respectively of $70,000 and $40,000. Boyd's Theatre is a structure of stone, iron and pressed brick, has a seating capacity of 2,000 and cost $250,000. The City-hall, seven stories in height, is the home of all the city officers, and is one of the best arranged structures in the West. It was erected at a cost of $550,000. The United States Custom-house, Post-office and Court-house, was commenced in 1892, and is completed at an expense of $1,845,000. It is of the Romanesque style of architecture. The main entrance is on 16th Street, with a loggia 15 by 50 feet enclosed by a balustrade, has a façade of five arches, embellished by polished granite pillars. The first floor is devoted exclusively to the post-office; the second floor is occupied by the customs, internal revenue, district attorney's office, railway mail service, and rural free delivery service; the third floor is used as United States district and circuit court rooms, United States marshal, pension agent and witnesses rooms; the fourth has rooms for grand and petit juries, weather bureau and civil service, with dormitories for railway clerks.

Churches.— Omaha is the see of the Roman Catholic and of the Protestant Episcopal churches. The latter has a fine stone cathedral building costing $60,000, with a chime of eight bells. There are in the city, 9 Baptist organizations; 3 Christian; 8 Congregational; 6 Evangelical; 1 Free Methodist; 3 Hebrew synagogues; 12 Lutheran; 13 Methodist Episcopal; 14 Presbyterian; 10 Protestant Episcopal; 2 United Presbyterian; 12 Roman Catholic; 1 Unitarian; 1 Christian Scientist; 1 Latter Day Saints; 1 Seventh Day Adventist; 1 Salvation Army; 1 Volunteers of America; 1 Universalist.

Charities.— These institutions include the Creche, the Childs Savings Institute, Immanuel Orphan Home, Clarkson Memorial Hospital, Convent of Mercy, County Hospital, the Nebraska Institute for the Deaf, and the Roman Catholic Orphan Asylum. Saint Joseph's Hospital of three stories and basement and costing $150,000, is known as "The Creighton Memorial," the name of its chief donor. The Bishop Clarkson Memorial Hospital was established in 1881, and its new building was completed in 1884.

Banks.— The statement for 1902 made to the comptroller of the currency has the following showing:

Name	Capital	Deposits
First National	500,000	$7,472,521.25
Omaha National	1,000,000	6,955,745.19
Merchants' National	600,000	3,683,063.25
Commercial National	400,000	1,607,453.12
U. S. National	400,000	4,171,907.97
Nebraska National	200,000	1,288,201.20
Union National	250,000	982,456.40
South Omaha National	250,000	2,773,543.83
U. S. Stock Yards National	400,000	2,915,094.39
Packers' National	100,000	1,241,047.42

Libraries.— The libraries are those of the New York Life Insurance Company, Law Library (2,500 volumes); Omaha Public Library (65,000 volumes); the library of Young Men's Christian Association; two Catholic libraries at Creighton College, one for the use of the faculty (8,000 volumes, being composed in part of rare and old books and manuscripts of the 15th, 16th, and 17th centuries); the other for the use of the students (12,000 volumes). The Masons, Odd Fellows, Swedish, Danish, and Bohemian societies all have valuable libraries. In October 1888 G. W. Lininger erected an art gallery in the Italian renaissance style, at a cost of $15,000, in which to house his judicious collection of paintings and other works of art. The present collection is valued at over $300,000 and consists of old oil paintings, modern oil paintings, water colors, statues and busts, vases and plaques, porcelains, curios and articles of virtu, and the whole is open to view and inspection of the public two days in the week.

Public Schools.— The schools of the city are under the control of the board of education, consisting of 15 members elected by the votes of the citizens. Women paying taxes and those who have children of school age vote for the

members of the board. The superintendent is appointed by the board. There are 50 school buildings in the city, 49 graded and 1 high school, costing in the aggregate $1,500,000. The graduates from the high school are admitted to many of the colleges east and west without examination. In addition to the public schools there are many private and parochial schools.

Industries.— There are many and diversified industries in Omaha. The first brewery was established in 1859 by Fred Krug, who has remained in the business, and is president of the Frederick Krug Brewing Company, with a capital of $1,000,000. The cost of their present building and machinery was $750,000; capacity 200,000 barrels yearly. The Metz Bros. Brewing Company commenced operations in 1864, and occupy a building erected at a cost of $351,000. The Omaha Brewing Association was organized May 1891, with a capital stock of $1,000,000. The brewery buildings, etc., cost $500,000; capacity 150,000 barrels. The Willow Springs Distillery was incorporated in 1872 and is now the third largest establishment of the kind in the United States.

The American Smelting and Refining Company commenced business in October 1870 with a capital of $60,000. In 1882 the Grant Smelting Company was consolidated with the Omaha Company. A reorganization was completed with a capital of $2,500,000. They handle silver, lead, copper ores, from the western States, Mexico and British possessions. The business of the past fiscal year of this plant was as follows: 123,515 tons lead, $9,881,200; 24,806,088.82 ounces silver, $13,643,348.85; 604,314.79 ounces gold, $12,491,186.71; 2,142,724 pounds copper, $257,126.88; 4,017 tons blue vitriol, $401,900. Omaha is in the centre of the great wheat and corn producing portions of Iowa, Nebraska, Kansas, and Missouri, and the largest cattle and hog productions of the country, are marketed here. For the year 1902 one elevator handled 12,000,000 bushels of corn, oats, and wheat.

Railroads.— The geographical position makes Omaha a natural railroad centre. Fourteen great trunk systems, with lines connecting to every part of our country, enter the city, thus bringing it into communication with all parts of the Union. No western city has greater railroad facilities. Within the past few years two magnificent railway stations have been erected, the Union depot at a cost of $400,000, and the Burlington costing $500,000. The Missouri River is spanned at Omaha by two railroad bridges, and one motor and wagon bridge. The following are the lines out of Omaha for the East: Chicago, B. & Q.; M. & St. P.; C. & N. W.; C. R. Is. P.; Illinois Central; Chicago & Great Western. To the North and Northwest, C. & N. W.; Illinois Central; St. P. M. & O. West and Southwest, B. & M.; U. P.; C. R. Is. P.; K. C., St. L. & C. B.; M. & P. South and West, B. & M.; M. & P.; Wabash; K. C., St. L. & C. B.

Trade and Commerce.— Over 300 firms, covering every line of mercantile industry known in the United States are engaged in wholesale and jobbing. The business extends east to the Mississippi River, north to Manitoba, south and southwest to Texas and Mexico, west to the Pacific. Omaha is a port of immediate transportation of foreign goods, which has permitted the merchants to receive merchandise and pay duties at home without the delay on the seaboard. The value of the jobbing business in 1890 was $47,000,000, and in 1902, $95,000,000. The value of productions of factories, industry, packing houses and smelters was (in 1890) $68,000,000; (in 1902) $105,000,000. At South Omaha are located the famous packing houses and stockyards, where more than $30,000,000 have been invested. The daily capacity of killing and preparing for market is 15,000 hogs, 5,000 cattle, and 4,000 sheep. All meats are subjected to careful investigation and chemical analysis by government inspection before shipping.

The live stock receipts at the stockyards are:

	Hogs	Cattle	Sheep	Horses	Total
1890	1,702,723	615,337	153,873	5,007	2,477,002
1902	2,247,428	1,010,815	1,742,539	42,079	5,042,861

Newspapers.— The first paper published in Omaha was *The Omaha Arrow*, its initial number being dated 28 July 1854. There are published in 1903, the Morning and Evening *World-Herald;* the Morning and Evening *Bee;* the Omaha *Daily News;* the Omaha *Daily Hotel Reporter;* Omaha 'Excelsior'; 'Mercury'; 'Western Laborer'; 'Bohemian Voice'; 'Commercial Exhibit'; Omaha 'Tribune'; 'Pokrok Zapadu'; 'Svenska Posten'; 'Swedish Journal Tribune'; 'Young Men's Journal'; 'Den Danske Pioneer'; 'Westliche Presse'; 'Examiner'; 'Central Farmer'; 'Enterprise'; 'Fraternal Union Advocate'; 'Nebraska Farmer'; 'Protector'; 'Quill'; 'Royal Woodman and Workers Gazette.'

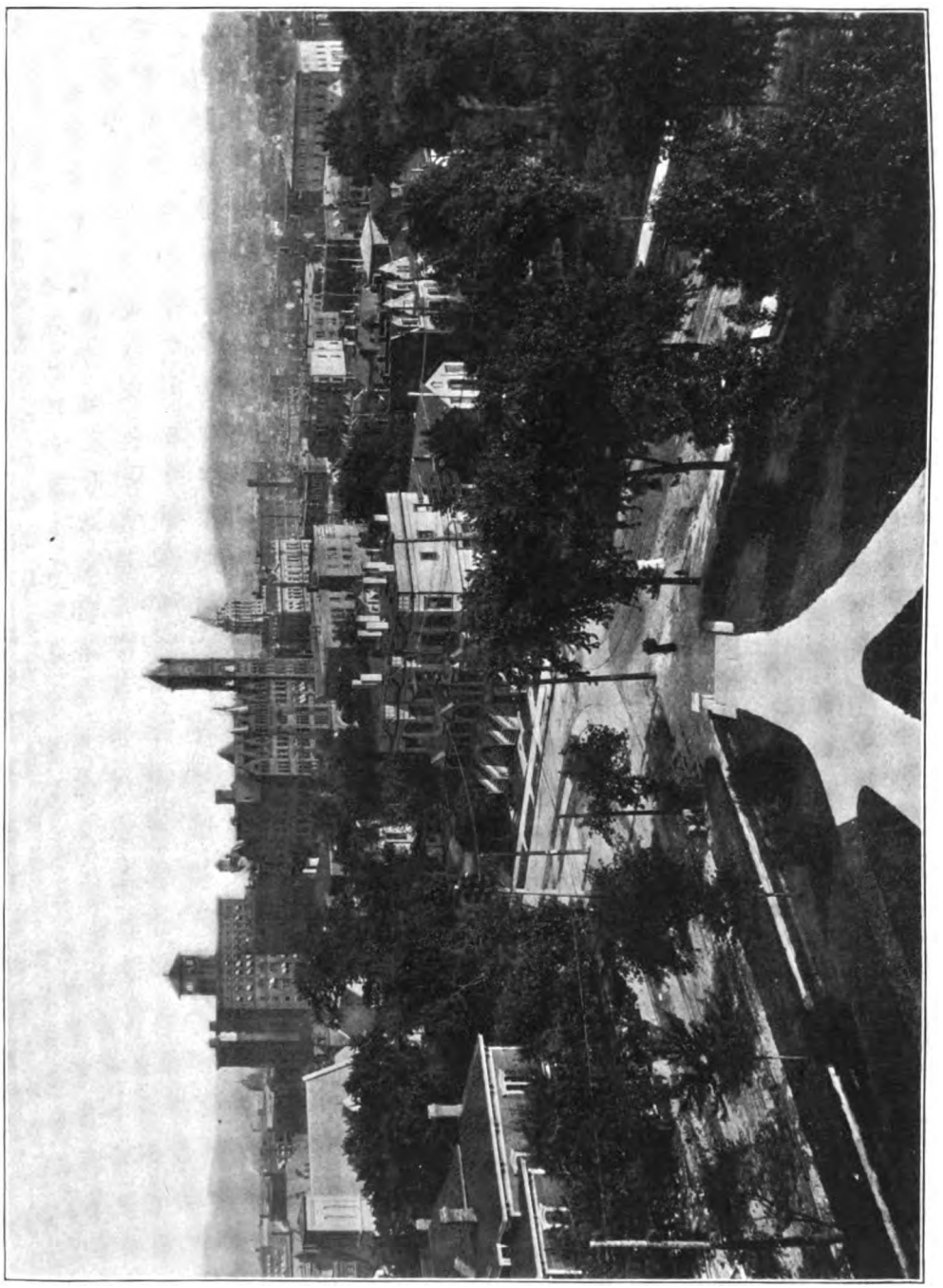
Population.— (1900) 102,553.

GEORGE L. MILLER.

Omaha Indians, or **Omahas,** a tribe of American Indians of the Dhegiha family residing in eastern Nebraska. The name is derived from an Indian word meaning "those who go up the stream, or against the current." They number about 1,200.

O'Mahony, ō-mä'ō-nĭ, **John Francis,** Irish politician: b. Kilbeheny, County Cork, Ireland, 1816; d. New York 7 Feb. 1877. He was educated at Trinity College, Dublin, and, fired with zeal for Ireland's cause, entered the ranks of the Young Irelanders in 1845 and took part in the insurrection of 1848, after which he was compelled to seek refuge in France. In 1854 he came to the United States. He was active in founding the organization of the Fenian Brotherhood, acted as its president for several years, and though personally taking no part in any of the insurrectionary movements in Canada or Ireland his advice was never withheld. He devoted his later years to literature, but endured great poverty. At his death his body was taken to Ireland, where he was buried with honors in Glasnevin Cemetery, near Dublin. He published: 'History of Ireland by Geoffrey Keating' (1857), which he translated from the Gaelic and annotated copiously. See Webb, 'Irish Biography' (1888).

O'Malley, ō-măl'ĭ, **Thaddeus,** Irish Roman Catholic clergyman: b. Garryowen, near Limerick, 1796; d. Dublin 2 Jan. 1877. He was ordained in 1819 and came to America, but through his independent ecclesiastical action was suspended in 1827 and returned to Dublin, where he became assistant at the cathedral under Arch-



VIEW OF CITY FROM HIGH SCHOOL BUILDING.

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bishop Daniel Murray and worked indefatigably for the passage of poor-laws for Ireland. He was appointed by the government rector of the Catholic university at Malta, but because of the reforms introduced by him among the students he was dismissed. In 1845 he founded the 'Social Economist,' and later the 'Federalist,' both of which he used in the interest of Ireland and to unite the Old Ireland and Young Ireland parties. He was often under ecclesiastical censure for the freedom with which he attacked the discipline of the Church; was an earnest advocate of the home-rule movement, and published: 'A Sketch of the State of Popular Education in Holland, Prussia, Belgium, and France' (1840); 'Harmony in Religion' (1870); 'Home Rule the Basis of Federation' (1873); etc. See Webb, 'Irish Biography.'

Oman, ō'man, **Charles William Chadwick,** English historian: b. Mozufferpore, Bengal, India, 12 Jan. 1860. He was educated at Winchester and Oxford, has been a fellow of All Souls' College, Oxford, from 1883, and deputy professor of modern history at Oxford from 1900. He is the author of: 'A History of Greece' (1888); 'Warwick, the King Maker' (1891); 'A Short History of the Byzantine Empire' (1892); 'A History of Europe 476–918' (1893); 'A Short History of England' (1895); 'History of the Art of War in the Middle Ages' (1898); 'History of the Peninsular War, Vol I., 1807–9' (1902); 'Seven Roman Statesmen' (1902).

Oman, ō-mān, Arabia, a sultanate at the eastern extremity of the peninsula, generally comprised in the maritime district extending along the Persian Gulf, the Gulf of Oman, and the Arabian Sea, from El Hasa to Merbat, near the Hadramut frontier. Area, 82,000 square miles. Although mainly a maritime kingdom, Oman proper is the richest part of the Arabian peninsula, both in agricultural products and in mineral treasures. The working of gold and silver filigree, with which daggers, belts, cups, and pipes are often adorned in Oman, supports great numbers in the larger towns. The inhabitants are tolerant, but superstitious and immoral. The form of government is a monarchy, limited by a powerful aristocracy with hereditary privileges, and the prescription of popular rights. The ruler is called the Imam or Sultan, and the capital of the state is Muscat (q.v.), a name also given to the sultanate. The present dynasty secured possession of the throne in 1741, and for some time Socotra, Zanzibar, and parts of the east coast of Africa were attached to Oman. A British Resident is stationed at Muscat, the sultanate being virtually a British protectorate. Pop. (est.) 1,500,000.

Omar I., ō'mar, 2d caliph after Mohammed; d. Medina 3 Nov. 644. See CALIPH.

Omar II., 8th caliph of the Omaides. See CALIPH.

Omar Khayyām, khī-yām', Persian poet and scholar: b. Naishāpūr, province of Khorassan, latter part 11th century; d. (according to tradition) 1123 (517 A.H.). His name is given as Ghiās uddīn Abul Fath Omar ibn Ibrahīm al-Khayyām. The epithet Khayyām, signifying "tent-maker," is indicative of his calling previous to the time when he was able to devote himself to science and literature. Nizām ul Mulk, the great vizir of Al Arslan and Malik Shāh, offered him preferment at court, but he requested instead the means of living in retirement and occupying himself with learning. He accordingly received a pension, and pursued researches especially in mathematics and astronomy. Subsequently he was made astronomer royal at Merv, and in that capacity prepared certain astronomical tables. He was also active in the revision (dating from 15 March 1074) of the ancient Persian calendar, a work comparable to the revision of the Julian calendar by Gregory XIII., to which it was similar in principle, and superior to which it has been ranked by some authorities. Among his mathematical writings are a work on algebra and a study of 'The Difficulties of Euclid's Definitions,' both still preserved. In his religious views he was unorthodox, and therefore viewed with suspicion by many of his contemporaries. He is best known to the West in later times as a poet somewhat in the manner of Lucretius, but more in that of Ecclesiastes. This philosophy he set forth in 'Rubāiyāt' (quatrains), of which, according to convention, the first, second, and last lines rimed (the rime being in many cases even quintuple), while the third line was for the most part blank but rarely followed the rime of the other lines. Each Rubāi was distinct, and in extant manuscripts is placed in an alphabetical arrangement dependent upon the letter concluding the rime. About 500 quatrains are assigned to Omar; many are probably not his. Perhaps his heretical views had something to do with the fact that a comparatively small number of MSS. exists, and none can be made an authority. The MSS. also vary more or less in the number of quatrains which they include. Edward Fitzgerald made of a selected portion of the quatrains an ingenious mosaic, which presents something of unity, but probably gives too consistent a structure to the pessimistic side of Omar. The Persian seems to have been of changeful mood, sometimes humble before Allah, again reproachful or defiant; hopeful and fatalistic; rebellious and aquiescent. He often ridiculed the orthodox, and perhaps he liked to confuse and perplex them. "For this," says Fitzgerald, "he is said to have been especially hated and dreaded by the Sufis." The Sufi poets, however, found it convenient to borrow of Omar, whose material they presented in their own mystic guise. Nevertheless, Omar had training in the Sufi doctrines, and some have detected a symbolic and mystic significance in his work. The generally known rendering into English is that by Fitzgerald (1859; later ed.), whose version was republished (1900) by Batson and Ross with commentary and introduction. There are also translations by Whinfield (2d ed. 1893) in his edition of 500 quatrains, a scholarly work; Payne (1898); and Heron-Allen (1898). There is a volume on the 'Sufi Interpretations of the Quatrains of Omar Khayyam and Fitzgerald' by Bjerregaard (1902). There are numerous versions in other modern languages, and Elihu Vedder published (1884) a series of illustrations which have been much praised.

Ombay, ŏm-bī', or **Allor,** Malay Archipelago, one of the Sunda Islands, about 20 miles

northwest of Timor, from which the Ombay Pass, in the line of one of the best routes from Europe to China, separates it. It is about 900 square miles in extent, 65 miles long, and 15 broad, and presents a bold coast and lofty interior. The mountains are covered to their summits with lofty trees. It is inhabited by savage tribes, said to be fierce and treacherous, and carries on some trade with Timor in birds' nests and provisions, exchanged for iron-work, Chinese wares and linen, Allor on the northwest and Bailoko on the southeast being the chief settlements and ports. It belongs to the Netherlands, and is included in the residency of Timor.

Ombre, ŏm'bĕr, a game of cards originating in Spain. It is usually played by three persons, with 40 cards (the eights, nines, and tens having been removed), and each player receives nine cards, three by three. The game is often mentioned in English 18th century literature.

Omdurman, ŏm-door'măn, Sudan, a native town on the White Nile, opposite Khartum. It was built as the capital of the Mahdi's successor, when Khartum was destroyed in 1885, and extends for four miles along the river bank. Under the Khalifa Abdallah it had a population of 500,000 inhabitants, living in one-storied mud huts, lining streets laid out on an orderly system, and guarded by a walled enclosure flanked with towers, accommodating 10,000 warriors. When the Khalifa was defeated, 2 Sept. 1898, Omdurman was hastily deserted, but with returning trade and prosperity has (1904) an estimated population of 60,000. Omdurman is the great mart of the gum-arabic, ivory, and ostrich-feather trade of northeastern Africa, and representatives of over thirty tribes congregate in its markets.

O'Meara, ō-mā'ra, **Barry Edward,** English physician: b. Ireland 1778; d. London 3 June 1836. He was household physician to the Emperor Napoleon I. at Saint Helena, and published 'Napoleon in Exile' (1822). Originally a surgeon in the British navy, he was serving on the Bellerophon in that capacity 7 Aug. 1815 when Napoleon went on board. Napoleon noting O'Meara's skill and knowledge of Italian, desired the surgeon to accompany him to Saint Helena. Having obtained Admiral Keith's permission, O'Meara remained with the ex-emperor till July 1818. He was then recalled and deprived of his rank, for having accused Sir Hudson Lowe before the admiralty of cruel and arbitrary conduct.

Omega, ō-mē'ga or ō-mĕg'a, the last letter of the Greek alphabet; hence, figuratively speaking, the end or last of anything. See ALPHA.

O'men, a sign believed to prognosticate a future event, between which and the event foretold there appears no relation of cause and effect, but which is usually received as an intimation from a superior power. Omens have been common among most nations, and are often remembered and mentioned after they have ceased to be credited. Though generally classed among superstitions, they may sometimes be founded on some hidden relation in things, some natural law of sequence the ground of which is unknown. They have been chiefly in vogue in the ruder ages and communities, though under the name of auguries they retained their influence during the whole period of pagan antiquity, and though eminent warriors and other popular leaders in moments of extreme doubt and peril have given notable examples of faith in them. Sneezing was deemed ominous in the time of Homer, and Eustathius states that it was lucky or unlucky according as it was directed to the right or the left. Aristotle discusses the problem why sneezing from noon to midnight is good, and from midnight to noon bad. At noon it was propitious. Among the ancient Persians sneezing was esteemed fortunate, a sign of contest between the fiery soul and the earthly body, and of the victory of the former. When the emperor of Monomotapa sneezes, says Codignas, it is proclaimed through the whole land as a signal for general joy. The itching of the nose implied that a stranger was coming. Burton, in his 'Anatomy of Melancholy,' states that "to bleed three drops at the nose is an ill omen." The spots on the finger nails were all ominous; the itching of the palm of the right hand promised a receipt of money; the doubling of the thumb within the hand was believed to have efficacy in avoiding approaching danger, and therefore the thumbs of dead persons were so folded. The way in which fires, candles, or lamps burned suggested divers omens. The superstition still prevails in many places that the howling of a dog by night presages a death in the neighborhood. Duncan Campbell expresses his faith in this omen, and adds: "Odd and unaccountable as it may seem, those animals scent death, even before it seizes a person." The screeching of the owl and the croaking of the raven have both in ancient and modern times been regarded as omens of some dire calamity. Divers presages concerning the weather have been derived from the habits of birds, bees, wasps, gnats, etc. Pennant states that many of the great families of Scotland received monitions of future events, especially of death, by spectres, wraiths, and shrieks. Fishermen and sailors discover omens in echoes, flashes, shadows, and other visible appearances. To throw a cat overboard, or lose a bucket, is believed to be unlucky. Whistling is supposed to stir up the wind. Stumbling has been the subject of numerous superstitions. Gaius Gracchus stumbled at his threshold on the morning of his death. To stumble on going out, says Bishop Hall, was mischievous; to stumble up stairs, says Grose, was lucky.

At the present day, in many parts of England and the United States, a superstitious belief in omens exists. It is regarded as unlucky to see first one magpie and then more; but two denote marriage or merriment; three, a successful journey; four, an unexpected piece of good news; five, that you will shortly be in a great company. To kill a magpie is to incur some terrible misfortune. When a person goes out on any important business, it is lucky to throw an old shoe after him. To present a knife, scissors, razor, or other sharp or cutting instrument to one's friend is unlucky, as they are apt to divide love and friendship. The falling of salt toward persons at table, the spilling of wine on their clothes, are evil omens. Breaking a looking glass betokens the death of the best friend of the person to whom it belonged. The burning of the cheeks, or tingling of the ears, that others were talking of us; if of the

left cheek or ear, ill; the right, well. A sow crossing the road before a person going on a journey, is believed to indicate a disappointment, if not a bodily accident to such person; but if the sow be attended by her litter of pigs, it denotes a successful journey, etc. See SUPERSTITION.

Omer Pasha, ō'mėr păsh'â, Turkish general: b. in the Austrian village of Plasky 24 Nov. 1806; d. Constantinople 18 April 1871. His real name was Michael Lattas, and his parents were Christians. Educated for the Austrian army, for some unrecorded reason he fled in 1828 to Bosnia, and, embracing Mohammedanism, obtained the post of writing-master to Abd-ul-Medjid, the heir-apparent to the Ottoman throne. In 1842 he was appointed military governor of the Lebanon, in 1843 suppressed an insurrection in Albania, and in the following years others in Bosnia and Kurdistan. He defeated the Russians in 1853 at Oltenitza, again at Silistria in 1854, and entered Bucharest. On 17 Feb. 1855 he repulsed with great loss 40,000 Russians who attacked him at Eupatoria. In October of that year he was sent to relieve Kars, but arrived too late. In September 1861 he was charged with the pacification of Bosnia and Herzegovina, which were again in insurrection. This being accomplished, he attacked the Montenegrins, captured Cetinje, and overran the country in 1862. He was made field-marshal in 1864, was sent to suppress the rebellion in Crete in 1867, and was minister of war from 1869.

Ommiades, ō-mī'ą-dēz, Arabian dynasty founded by Moawiyah, 661. Merwan II., 14th and last caliph of this race, was slain 10 Feb. 750, when the Abbassides came into power. See CALIPH.

Om'nibus, a Latin word signifying "for all," and now applied in several languages to the well-known vehicle used for the conveyance of passengers at a cheap rate. The famous mathematician, Blaise Pascal, is said to have introduced the vehicle in Paris. Unlike most other men of learning, Pascal was more or less interested in the affairs of practical life. He was the inventor of the push-cart that now perambulates our streets. In 1661 he had large wagons built for regular traffic in the heart of Paris. He allied himself in this undertaking with several influential friends, among whom was the Duke de Roannes. In 1662 Louis XIV. granted letters patent to Pascal, in which it was said that these carriages were intended for the comfort of poor people who had to go to courts of justice, or who were sick and so poor that they could not afford to pay the two pistoles exacted by the chairmen and the drivers of coaches. At first the use of the vehicle was not generally permitted. A royal decree forbade its use by soldiers, pages, lackeys, and other liveried servants, as well as artisans and porters. Pascal, in spite of the fact that he only lived to be 39, is said to have made no inconsiderable sum out of his invention. After the vehicle had been in use for some 16 years, it was abandoned for various reasons. It was not until 1812 that it was again introduced, this time in Bordeaux, which city was followed in 1821 by Nantes and in 1827 by Paris. The vehicle was improved and rapidly became popular. In modern times the vehicle was called an omnibus simply for the reason that it was intended for the carriage of all, without any restrictions as to lackeys, pages, or footmen. A Mr. Shillibur started the first omnibus in London in 1829, and they were introduced into New York in 1830, and Amsterdam in 1839.

Omnibus Bill. See COMPROMISE OF 1850.

Omophag'ic Rites, or **Omophagia** (Greek, ὠμοφαγια, eating raw flesh), religious rites in which uncooked flesh was eaten. In such religious ceremonies cannibalism sometimes formed a part, as in the Orphic rites, in which the passion of Zagreus (q.v.), the infernal Dionysus, was commemorated by the sacrifice of a man, who was dismembered and eaten. These rites were celebrated at Chios and Tenedos, and from them Dionysus obtained the title of eater of raw flesh. Dionysian rites were introduced into Italy about the end of the 3d century B.C., and in 189 B.C. the senate, informed of their nature by a freedman who had been marked out as a victim, issued the decree "Concerning the Bacchanalian Rites," which banished the Orphic mysteries from Italy. A ram or an ox was afterward substituted for a human victim in the Dionysian celebrations. See DIONYSUS; BACCHUS; ORPHEUS.

Omphale, ŏm'fą-lē, daughter of Iardanus, king of Lydia and wife of Tmolus, after whose death she reigned as queen. Heracles (Hercules) was sold to her for a slave and performed some remarkable exploits in her service. Omphale bore to him several children, and he was so enamored of her that, to please her, he assumed woman's dress, wore gold rings, had his hair curled, and spun among her slave-girls while she wore the lion's skin and carried the club. Omphale governed with severity, and was no less licentious and extravagant than cruel.

Omsk, Asiatic Russia, the former capital of western Siberia, now capital of the General-Governorship of the Steppes and of the province of Akmolinsk, on the Irtish, at the confluence of the Om, and on the Trans-Siberian railway, 280 miles southeast of Tobolsk. It has modern fortifications in the form of the regular polygon, flanked with five bastions, and is the most important military station on the line of the Irtish. It contains a school for interpreters and a military school for the Cossacks. The trade, carried on chiefly with the Kirghiz, is of considerable extent, and consists chiefly in brandy, tobacco, etc., for which cattle are given in exchange. Pop. (1897) 37,470.

Oña, Pedro de, pā'drō dā ō'ñā, Chilean poet: b. Confines, Araucania, about 1565; d. Lima about 1620. He was educated at Lima (then Los Reyes del Peru), and there wrote his great epic and apparently his first poem, 'Arauco Domado' ('Chile Conquered,' 1596; re-edited 1849), which is reckoned a Spanish classic, being included in the Spanish Academy's 'Catalogo de Autoridades de la Lengua,' as well as various sonnets and the descriptive poem, 'Temblor de Lima el Año de 1607' ('The Lima Earthquake of 1607,' 1609).

Onager, ŏn'ą-jėr, or **Ghorkhar,** the small pale variety of wild ass (q.v.) of western India and Beluchistan. See KIANG.

Onager. See ORDNANCE.

Onagra'ceæ. See EVENING PRIMROSE.

Oñate, Juan de, hoo-än' dā ō-ñä'tā, Spanish explorer: b. Guadalajara, Mexico, about 1555; d. about 1615. He was a man of position and influence in the colony, a son of the founder of Guadalajara and married a granddaughter of Cortés. In 1595 permission was granted him by the viceroy Velasco to colonize the district north of the Rio Grande, but Monterey, Velasco's successor, withheld full powers as governor until 1598, when Oñate set out on his expedition with a large force of soldiers and Indians, and many wagons and cattle. He crossed the Rio Grande, founded San Juan, the first capital of New Mexico, and, notwithstanding conflicts with the Indians, the colony flourished. In 1599 and 1604 Oñate explored Arizona, and though records show that he was not governor of the colony after 1608, there is nothing by which to accurately determine the date of his death.

Onawa, ŏn'a-wa, Iowa, town, county-seat of Monona County, within five miles of the Missouri River, on the Illinois C., Chicago & N. W., and Sioux City and P. R.R.'s; 37 miles southeast of Sioux City. It is the centre of an excellent agricultural and stock-raising region and has a considerable local trade. It has public schools and a public library (founded in 1867). Pop. (1900) 1,933.

Oncarhyn'chus, the genus of the *Salmonidæ* which includes the salmon of the North Pacific. See SALMON.

One Hundred Committee, the name given an organized body of New York citizens, who during the occupation of Manhattan by Lord Howe, were intent upon maintaining their independence. Governor Tryon, the British commander, was so intimidated by the Committee, he feared for his personal safety and took refuge on board a British sloop-of-war. The committee gave courage to the Sons of Liberty who removed the cannon from the royal battery at the foot of Broadway to a place of safety for the use of the people.

Onega, ŏn'ĕ ga (Russ. ŏ-nyĕ'gä), (1) a lake in Russia, near the centre of the government of Olonetz, after Lake Ladoga the largest lake in Europe, covering an area of about 4,900 square miles. It is of irregular shape, has generally rocky shores, and numerous creeks, bays, and islands, and is well supplied with fish; numerous shoals and sand-banks interrupt its navigation. It is fed chiefly by the Migra, Shuia or Shuisk, Vodla, and Vytegra, and discharges itself into Lake Ladoga by the Svir. A canal between the Vytegra and the Kayla, an affluent of Lake Bielo, gives it an opening into the basin of the Volga. (2) A river to the east of Lake Onega, which, issuing from Lake Lacha, government of Olonetz, flows first northeast, then northwest, and after a course of about 270 miles, so much broken by falls and rapids that it cannot be considered as navigable, falls into the White Sea at the southeast extremity of the Gulf of Onega.

Oneida, ō-nī'da, N. Y., city in Madison County; on the New York C. & H. R., the West Shore, and the New York, O. & W. R.R.'s; about 110 miles in direct line west by north of Albany, the State capital. The place was settled in 1839, at the opening of the Utica & Syracuse Railroad, now the New York Central & Hudson River Railroad, and was incorporated as a village 20 June 1848. It was granted a city charter 28 March 1901. It is the commercial centre of a fertile agricultural region, and has considerable manufacturing interests. The chief manufacturing establishments are chair factories, push cart works, casket and carriage factories, knitting mills, steel pulley works, cigar factories, canneries, iron works, and sash and blind factories. There are about 1,800 employees in the manufactories. It has a large trade in its own manufactures and in farm and dairy products and fruit. It has a city hospital, an Old Ladies' Home, an excellent high school, and eight churches.

Oneida Lake (q.v.), five miles north by west, is a popular outing place. The Oneida Community (q.v.) is located two miles to the south, and Oneida Castle, the site of the ancient headquarters of the Oneida Indians, is about four miles south. The four banks have a combined capital of $235,000, and the annual amount of the business is about $30,000,000. The government is vested in a mayor and six aldermen. The city owns and operates the waterworks. Pop. (1890) 6,083; (1900) 6,364. Consult Durant, 'History of Oneida County.'

S. A. NIXON,
Editor 'Oneida Union.'

Oneida, a lake in New York, on the boundaries of Oneida, Oswego, Madison, and Onondaga counties; about 18 miles south of the eastern part of Lake Ontario. It is 20 miles long and about 5½ miles wide. Several small streams flow into the lake; the head-waters of those from Oneida County are near the source of the Mohawk River. The outlet of the lake is Oneida River, whose waters enter Lake Ontario through Oswego River. Sylvan Beach, on the east shore, is a favorite resort. A number of small villages are along the shore, and the lake has a few islands.

Oneida Community, a settlement of Communists (see COMMUNISM) at Oneida, Madison County, N. Y., sometimes called Perfectionists. The community was founded in 1847 by John Humphrey Noyes (q.v.). He had originally formed a small settlement of his fellowmen at Putney, Vt., in 1838. During the first 10 years the settlement at Oneida made slow progress, but eventually became very successful, as a result of numerous industries and manufactures. The community followed a complex marriage system, there being no ceremony nor permanent ties between couples, and the community assumed all responsibility in the support and education of children. Outside opposition, principally from the Protestant churches, arose, and the marriage system was abolished in 1879. The community then reorganized and a joint stock company was organized in 1881. The co-operative plan was followed in financial and domestic matters. In 1882 the community had property valued at $600,000. Since the reorganization branch manufactories have been established at Niagara Falls, Sherrill, and Kenwood, N. Y., and in 1903 the total valuation of community property was said to exceed $2,000,000. There are upward of 300 persons in the community.

Consult Hinds, 'American Communities' (1902).

Oneida Indians, an American tribe of the Iroquois confederacy formerly living on the shores of Oneida Lake, N. Y. They were friendly to the French and the Jesuits, but they took sides with the Americans in the Revolutionary War. Subsequently they were attacked by the hostile Iroquois under Brant, who burned their villages and forced them to take refuge in the American settlements. A considerable number of them settled on the Thames River, Ontario, Canada, where about 800 survivors lived in 1903. Others reside in Wisconsin, New York, and on the Grand River, Canada. There are about 3,000 of them now living. See also SIX NATIONS.

O'Neil, ō-nēl', **Charles,** American rear-admiral: b. England 1842. He entered the United States navy as master's mate in 1861; was on the Cumberland at the capture of Forts Hatteras and Clarke in August 1861, and served in the engagement with the Confederate iron-clad Merrimac, 8 March 1862, as well as during the two attacks on Fort Fisher. He was promoted captain in July 1897, and has been chief of the naval bureau of ordnance from June 1897. He was promoted rear-admiral in April 1901.

O'Neill, Eliza, LADY BECHER, Irish actress: b. Ireland 1791; d. there 29 Oct. 1872. She made her first appearance at 12 as the Duke of York in her father's company, and her formal début at Covent Garden in 1814 as Juliet. She was an emotional actress and suited for tragedy roles, in which she played for five years as England's most popular actress. She retired from the stage on her marriage to William Becher, M.P., who later became a baronet.

O'Neill, Owen Roe («RED OWEN»), Irish warrior, d. 6 Nov. 1649. He commanded the Irish forces in the wars against the English in the first half of the 17th century. On 5 June 1646, with 5,000 men he routed Monroe's army of 7,000, killing one half of the enemy.

Oneonta, ō-nẹ-ōn'ta, N. Y., village in Otsego County; on the Susquehanna River, and on the Delaware & H., the Ulster & D., and the Oneonta, C. & R. S. R.R.'s; about 70 miles southwest of Albany. The town of Oneonta was settled prior to the Revolution, but the first settlement within what is now the village limits was made in 1790 by Frederick Brown. It was incorporated as a village in 1848. It is in an agricultural region and has several important industries connected with farm products. The chief manufacturing establishments are Delaware & Hudson shops, which have 750 employees; the cigar factories, 100 employees; knitting-mill, 150 employees; flour-mill, 100; shirt factory, 100; silk-mill, 100. It is the seat of the Oneonta State Normal and Training School, which had enrolled in 1904 nearly 1,000 pupils. It has the Aurelia Fox Memorial Hospital, a State armory, a public library, and 10 churches. The government is vested in a president and a board of six trustees, two of whom are elected each year. Pop. (1890) 6,272; (1900) 7,147.

F. M. H. JACKSON,
Business Manager 'The Star.'

Onias, a Jewish high priest, the son of Simon. About 188 B.C. he fled to Egypt, where he built the temple of Leontopolis, or rather he remodeled an old pagan temple given to him by the Egyptians. This Leontopolis was located near Heliopolis, 180 stadia from Memphis, and must not be confounded with the Leontopolis of the Delta. There is more or less obscurity regarding Onias, and from various accounts there appears to have been three of this name. Josephus declares that the builder of the Leontopolis was a son of Onias who fled to Egypt in the time of Antiochus V., about 164 B.C. Another account says that Onias III. was murdered by Andronicus in a sanctuary near Antioch. In Isaiah (xix. 18–25) reference is made to five cities in Egypt, occupied by Hebrews, one of them called Leonopolis (the city of the Lion); and also to an altar and sacred tower at the border of Egypt where the Egyptians are expected to offer sacrifices to Yahweh.

Onion, a river in Vermont. See WINOOSKI.

Onions, and Onion Culture, various species of *Allium,* a genus of the lily family; specifically, *A. cepa,* a bulbous-rooted biennial herb with hollow radical leaves and a leafless, hollow, usually swelling stem, which bears an umbel of small six-segmented bell-shaped white or pinkish flowers, replaced in some cases by bulblets. It has been so long in cultivation that its original form is not definitely known. Probably it is a native of western Asia and adjacent parts of Africa, since it is mentioned in old Egyptian writings, the Pentateuch, etc. It has spread to all countries occupied by civilized man, by whom its bulbs (and to some extent its leaves) are used as a vegetable and for flavoring various culinary preparations.

Being very hardy, the onion may be planted as soon as the ground can be worked in early spring, or it may be cultivated during the winter where the temperature does not fall to the freezing point. In the Southern States it is generally cultivated as a winter crop. The essentials of its cultivation are a well-drained, light, friable soil, rich in all plant food and humus, and, above all else, free from weeds. Onions, especially while little, cannot compete with weeds. Reclaimed marshes, such as are used for celery, are highly valued also as onion fields. Every effort having been made to make the soil as loose as possible, the seed is sown in drills about 12 inches apart, machines being used for the purpose. Since the plants are somewhat slow in making their appearance, and are very inconspicuous, planters often mix a few radish or turnip seeds with the onion seed, the young radishes being quick to appear, conspicuous, easy to remove, and serving to indicate the positions of the rows until the onion plants can be seen. Throughout the growing season the onions are kept free from weeds, thinned to distances about three inches apart, and the soil between the rows is kept loose and open by frequent cultivation. When the necks of most of the bulbs have turned yellow in the autumn the bulbs are pulled, four or five rows being combined in one windrow, and the «scullions,» or thick-necked, immature bulbs, discarded. After drying in the field for a few days the bulbs are gathered in crates, which are piled under cover for further drying before sorting and shipping them to market. Dryness, coolness (just above freez-

ing), and soundness are essentials in storing onions during the winter.

Onion cultivation has several modifications of importance. Improved methods of culture consist in starting the plants in hotbeds or cold-frames, and transplanting them to the field when four or six inches tall, and thereafter cultivating them as above described. The advantages claimed for this method are that the plantlets are under complete control while small — the precarious time; that they are readily transplanted under ordinary conditions; that the cost of transplanting is not greatly in excess of that of weeding in the other method; and that not only is there a more even stand in the field, but that the bulbs are larger and of more uniform grade. Another frequent practice is the sowing of seed in the autumn where the plants are to remain; and a still more common one is the planting of "sets,"— little onions which have been specially grown for this purpose, the seed being sown very thickly the year previous. These sets are especially valued for the production of "bunch onions," which appear in the markets during the early spring and summer months.

Some varieties of the onion are remarkable for their method of propagation. The potato or multiplier onion has two or more "cores" or "hearts," each of which will send up leaves when the bulb is planted. If separated from its fellow hearts, each core will produce a new compound bulb and sometimes send up a flower-stalk. This variety is therefore a perennial which resembles garlic in its method of propagation, and is intermediate in flavor between garlic and the common onion. Another botanical variety is the "top" or "tree" onion, which develops bulblets instead of flowers, or both, at the top of the flower-stems.

Of the varieties of the common onion grown in America, the red ones are usually of strongest flavor, the yellow ones next, and the white ones mildest. But still milder and better flavored are the foreign varieties known as Bermuda, Spanish, etc., which are less hardy than the common kinds and are little grown in the North. They are largely cultivated in the South and in California, whence the markets derive their chief supply.

The Welsh onion or "cibol" (*Allium fistulosum*) is a native of Siberia. It resembles the leek in the absence of a distinct bulb, but differs from the leek in its hollow, onion-like leaves, which are cut like those of the shallot and used for flavoring. It is of dwarfer growth than the common onion and has more clustered leaves. It may be propagated by division of the bulbs or by seeds. In the United States it has not become very popular.

Onions are occasionally seriously attacked by so-called parasitic plants, which may devastate whole fields and which are not of easy control by any devised method. Bordeaux mixture has been recommended, but rotation, the crop being planted upon smut-free land, is perhaps most satisfactory.

Among the insects which prove destructive to the onion are several species of cut-worms, all of which may be held in check by poisoned baits, such as sweetened bran or clover, or by trapping in early spring when the insects revive after passing the winter in the larval stage. The onion thrips (*Thrips tritici*), a tiny sucking insect, sometimes devastates whole fields by appearing in great numbers, puncturing the leaves, which turn yellow wherever pierced. It is especially troublesome in Bermuda. Kerosene emulsion has been most frequently recommended as a remedy. The most serious pest, however, is perhaps the onion maggot, the larva of a fly (*Agrotis messoria*) which lays its eggs close to the young onions in early spring. The larvæ burrow into the young bulb, causing the plant to wilt and decay, a result which follows even slight injury. In late spring the maggots pupate and in about two weeks appear as adults, which lay eggs for a second brood. This brood winters partly as adults and partly as pupæ. The best remedy is probably ground tobacco-stems liberally applied to the young plants in early spring. This acts as a repellant, an insecticide, and as a fertilizer, and may be applied without fear of its injuring the plants. Another good plan is to pull and burn the plants of the early sowing when found to be wilting, which will lessen the number of flies able to lay eggs for the second brood. Nitrate of soda and kainit are recommended to be sown broadcast after the removal of the wilted plants; these are thought to act as insecticides and fertilizers.

Consult Bailey, 'Cyclopedia of American Horticulture' (1900–2) and the special literature therein mentioned under the article *Onion*.

M. G. KAINS,
Horticulturist.

On'kelos (Aramaic for the Greek name Akylas), author of the Targum or Chaldee paraphrase of the Pentateuch which bears his name. According to the Babylonian Talmud he lived in the time of Gamaliel, but is not earlier than the 2d and not later than the 3d century. His Chaldee is purer than that used in Palestine, and he may have been a Babylonian. His version is good, and continued until the beginning of the 16th century to be chanted in the synagogues alternately with the Hebrew. It has often been printed with or without the Hebrew text. See TARGUM.

Onomacritos, ŏn - ō - măk'rĭ - tŭs, Greek soothsayer and poet, who lived in the time of the Pisistratidæ, 6th century B.C. At Athens he was the head of an Orphic sect and expounded the mysticism, poetry, and theology of Musæus, while his pupils arranged the Homeric poems in connected series in accordance with the suggestion of Pisistratus. Having been detected making an interpolation in one of these oracles, he was banished from Athens by Hipparchus about 516 B.C. He withdrew to Persia, where the Pisistratids employed him to encourage Xerxes to invade Greece by repeating to the king such oracles as seemed to promise success.

Onomasticon, a Greek term properly meaning a list of names or words, denotes particularly a dictionary or encyclopædia in which individual subjects or things are mentioned and explained under their own names or heads. The oldest work under this name still extant is that of Pollux, executed in the 2d century B.C., in the Greek tongue.

Onondaga, ŏn-ŏn-dā'ga, a lake in New York, near Syracuse. The outlet is Seneca River. Onondaga Castle, the headquarters of the Onondaga Indians (q.v.), was near this lake.

Onondaga Indians, an American tribe of the Iroquois confederacy residing in central New York, on the shores of Onondaga Lake. In 1660 there were about 1,600 in the tribe, and fully 1,000 still survive. About one half of the original tribe followed Brant to Canada and settled on the Grand River, in Ontario.

Onondaga Period, in geology, the central division of the Upper Silurian (see SILURIAN), coming between the Niagara and the Lower Helderberg periods. It may be divided into two formations, which seldom occur together, namely, the Salina and the Water-Lime groups. The former reaches its maximum thickness in New York, near Syracuse, and is characterized by the great salt-mines of central New York; in western Ontario it is 1,400 feet thick, containing limestone shale and dolomite as well as salt. The Water-Lime group is a hydraulic limestone, containing valuable gypsum quarries near Syracuse, and in Cayuga and Genesee counties, and at Gypsum, Ohio, near Sandusky; hydraulic cement is produced in Ulster County, N. Y. There are few fossils in the Water-Lime group and scarcely any in the Salina formation. The rocks of the Onondaga period run south from central and eastern New York into Pennsylvania, and west through parts of Ohio, Michigan, and Wisconsin.

Onosander, more correctly ONESANDER, a writer on military tactics who lived at Rome in the middle of the 1st century after Christ, and composed in Greek, under the title of Strategetikos, an excellent work on the art of war.

Onospin, in chemistry, $C_{30}H_{36}O_{15}$. Produced, together with formic acid, by boiling ononin with baryta water. On passing carbonic acid gas into the solution, and digesting the precipitate in boiling water, onospin deposits on cooling, as a white, interlaced, crystalline mass, insoluble in ether, but soluble in alcohol and the alkalies. It is colored crimson-red by sulphuric acid and binoxide of manganese. Melts at 162°.

Ontario, Canada, the most populous province of the Dominion, formerly called UPPER CANADA, or CANADA WEST, bounded on the north by Keewatin, the Albany River, and James Bay, the southern extension of Hudson Bay; on the northeast and east by the province of Quebec and the Ottawa River; on the south by the Saint Lawrence River, Lake of the Thousand Isles, Lake Ontario, Niagara River, and Lake Erie; and on the west by the Detroit River, Lake Saint Clair, Saint Clair River, Lake Huron, Lake Superior, and Manitoba. Area 260,862 square miles, of which 40,354 square miles are water. For administrative purposes the province is divided into 44 counties, subdivided into townships and 98 electoral districts, including the three unorganized districts of Algoma, Thunder Bay, and Rainy River. The capital is Toronto (q.v.), and the province also contains the Dominion capital, Ottawa (q.v.), situated in the eastern part of the province. Other important cities and towns are Hamilton, London, Kingston, Brantford, Guelph and Saint Catharine's (qq.v.).

Topography and Physical Features.— The surface generally is an undulating plateau land with no considerable elevations. The Laurentian Hills with a maximum altitude of 1,200 feet extend westward from the Thousand Islands near Kingston to north of Lake Simcoe and constitute the watershed separating the rivers flowing into the Great Lakes, from those entering Hudson Bay, and the Ottawa and Saint Lawrence Rivers. The chief rivers are those already mentioned, with the Albany, entering James Bay, and the Niagara, the celebrated falls and gorge of the latter belonging partly to the province and partly to the United States. Besides the Great Lakes numerous smaller lakes, including Nipissing, Nipigon, Simcoe, and Muskoka, belong to the province.

Natural Resources.— About one half of the province is covered with timber, chiefly pine, spruce, tamarack, oak, and hickory, with the water facilities making lumbering one of the principal industries. Fur-bearing animals, the mink, otter, skunk, are obtained in considerable quantities in northern Ontario, which is also a popular hunting ground for moose, caribou, and other large game. The fisheries are important, the catch consisting of trout, whitefish, herring, pickerel, etc., and in 1901 being valued at $1,428,078, of which over $550,000 worth was exported. The province is rich in minerals, which are found chiefly in the Huronian rocks which with the Laurentian series, both of Archæan crystalline formation, constitute the principal geological characteristics of the region. The minerals include iron, copper, lead, plumbago, apatite, arsenic and antimony, while gypsum, marble, and building stone are abundant; gold and silver deposits exist, the latter very extensive in the country along the shores of Lake Superior and westward to the Lake of the Woods. In 1883 nickel was discovered at Sudbury, the deposits since proving to be among the richest in the world. The province is rich in petroleum, the wells in the southwest, especially in Lambton County, yielding immense and apparently inexhaustible supplies, over 30,000,000 gallons annually, while the same may be said of the salt wells on the shores of Lake Huron. Natural gas fields in the east near Niagara and in the west near Detroit, supplying Buffalo and Detroit respectively, have been exploited to the value of about $300,000 annually. In 1899 the government reserved to itself the right to prohibit the export of nickel ore. The entire output for the years 1898–1900 was exported to the United States, chiefly for use in naval construction. In 1902 the nickel mines produced 10,693,410 pounds, valued at $5,025,903. The value of Ontario's mineral production in 1901 was $14,351,585. A bureau of mines was created in 1891.

Climate.— The climate is inclined to the extremes of heat and cold during summer and winter respectively, but owing to the dryness of the atmosphere it is always healthful and bracing. Extreme cold is felt only in the northern part, the vicinity of the Great Lakes in the south greatly modifying the extremes of temperature. The average temperature for January in the south is 21°, minimum 10° below zero; the average for July is 68°, maximum 90° but rare, the ordinary maximum being 80°.

Agriculture.— Farming is an important occupation especially in the south, where soils of black loam, with clay and sandy varieties, are of excellent quality, and highly productive. The richest, most thickly settled, and most highly cultivated portion of the province is the peninsula between the Ottawa River and Lakes On-

tario, Erie, and Huron. The crops raised are chiefly wheat, barley, oats, Indian corn, potatoes and some tobacco, and the fruit-growing farms of some districts yield a plentiful crop of apples, plums, pears, peaches, and grapes. In 1902 there were 6,048,024 bushels of spring wheat raised and 20,033,669 of fall wheat; 21,890,602 bushels of barley, 106,431,439 bushels of oats, 20,512,194 bushels of Indian corn (in the ear), and 12,942,250 bushels of potatoes. Stock raising, dairy farming, and bee culture are among comparatively recent industries of the province which have been attended with encouraging results, largely due to the easy accessibility of markets by rail, supplemented by the lake, river, and canal navigation. The value of live-stock sold or slaughtered in 1901 was $38,457,018; the wool clip of the province in 1901 was $5,834,097 and the products of 1,167 cheese factories amounted to $12,269,073.

Manufactures and Commerce.—The manufactures are numerous and abundant, chiefly owing to the favorable position which the province occupies with regard to water-power, although steam-power has been introduced to a large extent, coal being obtained without difficulty by means of the Lakes, from Pennsylvania and also from Nova Scotia. Chief among the supplies of water-power are the falls on the Ottawa River and the rapids of the Saint Lawrence, while the works rapidly approaching completion on the Ontario side of the Niagara Falls will give the province the most extensive water-power works in the world. The principal manufactures are lumber and its by-products, agricultural implements, iron and woodware, wagons and carriages, railway rolling-stock (including locomotives), cottons and woolens, leather, furniture, flax, ordinary iron and hardware, paper, soap, etc. The value of the exports in 1902, manufactured goods, agricultural products, animals and their products, timber, minerals etc., was $48,597,480. The imports, of which the chief was coal, amounted to $85,235,418, the duty on which was $12,577,343. The United States and Great Britain share the bulk of the foreign trade.

Railways, Canals, and Shipping.—Ontario has a perfect network of railways, in 1902 over 6,800 miles, which has proved of great advantage in the development of the manufacturing and agricultural industries. In summer it is supplemented by the means of transport provided by the Lakes and by a magnificent system of canals. The principal canals are the Sault Sainte Marie Canal, and the Welland Canal, the latter 27 miles long, east of and parallel to the Niagara River, connecting Lakes Erie and Ontario. In 1900 the provincial shipping consisted of 1,064 steamers and 546 sailing vessels, with an aggregate of 141,112 tons.

Government.—The provincial government is administered by a lieutenant-governor appointed by the governor-general for five years, assisted by a responsible ministry. There is only one chamber, the Legislative Assembly, elected by ballot for four years, which had 98 members, by the apportionment of 1901; on the same basis the province sent 24 senators and 92 representatives to the Dominion Parliament. The government's policy is to encourage the development of provincial resources. Among pending measures are those for the drainage of swamp lands, for the encouragement of cold storage, for reservation and preservation of forests, for game protection, and for the establishment of sanatoriums for consumptives. The revenue of Ontario is made up of subsidies and contributions from the Dominion treasury, land and lumber sales, licenses, stamps, etc. The expenditure is invariably under the revenue, and the finances of the province are in a thoroughly satisfactory condition. The total government receipts for 1901 were $4,446,044; total expenditures, $4,038,834. The municipal system is one of the most perfect in the world, and affords a pattern followed in many other countries.

Population.—The total population in 1901 was 2,167,978, as compared with 2,114,321 in 1891, showing an increase of less than 2½ per cent, although the province contains about two fifths of the whole population of the Dominion. The majority of the population is of English descent, Scotch, however, predominating in Bruce, Grey, and Glengary Counties; Irish, German, and other nationalities are found around Toronto. There are about 21,000 Indians.

Education.—The school system of Ontario is admirable, and is under the control of a minister of education, who is always a member of the Provincial Cabinet. The schools are supported by a tax on property, with state grants, and are free to all. They include kindergartens, public schools, and high schools or collegiate institutions. Roman Catholics may, if they think proper, establish separate schools, and are then exempted from supporting the public schools, receiving a separate grant from government. There are 81 schools for Indian children, 10 normal schools, 12 normal colleges, 55 country model schools, art schools, and 117 free libraries under the care of the board of education. At the head of the educational system stands the Toronto University. The total receipts for school purposes in 1900 were $5,202,918; total expenditures, $4,372,059.

Religion.—There is no state religion. The membership of the principal denominations according to the census of 1901, was: Methodist, 666,360; Presbyterian, 447,383; Roman Catholic, 390,355; Church of England, 367,940; Baptist, 116,426; other denominations, 156,000.

History.—Ontario was first settled by the French after its exploration by Champlain in 1615. The French occupation was marked by the wars with the Iroquois Indians or Five Nations in which the Huron allies of the French were almost totally annihilated. In 1763 with the rest of Canada Ontario passed into the hands of Great Britain, who organized the province of Quebec in 1774 and in 1791 divided it into Upper and Lower Canada. At the close of the American Revolution in 1783, Ontario received a notable immigration of United Empire Loyalists from the United States. Upper and Lower Canada were reunited in 1841, and again separated when the Dominion of Canada was organized in 1867, the west province becoming the province of Ontario. Prior to this, the chief incidents of its history were several battles of the War of 1812, notably those of the Thames, of Lundy's Lane, etc., and an unsuccessful rebellion in 1837.

Consult: 'The Statistical Year Book of Canada' and 'Geological Survey of Ontario,' both published annually.

CHARLES LEONARD-STUART, B.A.,
Editorial Staff, 'Encyclopedia Americana.'

ONTARIO
AND
QUEBEC
SCALE OF MILES
0 10 20 30 40 50 60 70 80 90 100
Population of places is indicated by different lettering, thus:
50,000 and over ---------- MONTREAL
10,000 to 50,000 ---------- Sherbrooke
5,000 to 10,000 ---------- Pembroke
1,000 to 5,000 ---------- Mordaburg
Smaller Places ---------- Kirkfield
Railroads ----------
Canals ----------
Longitude West from
DISTRICT OF ALGOMA
DISTRICT OF NIPISSING
LAND DISTRICT OF
Lake Huron
Georgian Bay
Lake Erie
Lake Ontario
Lake St. Clair
Saginaw Bay
North Channel
Manitoulin I.
Grand Manitoulin I.
Great Manitoulin I.
Toronto
Hamilton
Niagara Falls
Buffalo
Detroit
Windsor
Sarnia
Port Huron
Flint
Bay City
Saginaw
Pontiac
London
St. Thomas
Guelph
Brantford
Stratford
Woodstock
Berlin
Galt
Peterboro
Kingston
Belleville
Lockport
Dunkirk
Erie
Alpena
Sault Ste. Marie
Algoma
Sudbury
Nipissing
Parry Sound
Muskoka
Haliburton
Victoria
Peterborough
Simcoe
Wellington
Grey
Bruce
Huron
Perth
Waterloo
Wentworth
Lincoln
Welland
Norfolk
Oxford
Middlesex
Lambton
Kent
Essex
Elgin
Brant
Haldimand
Dufferin
Ontario
Durham
Northumberland
Prince Edward
Hastings
Renfrew
Lennox
Addington
Frontenac
Leeds
Grenville
Carleton
Russell
Prescott
Stormont
Dundas
Glengarry
Argenteuil
Pontiac
Ottawa
Gatineau
Labelle
Terrebonne
Montcalm
Joliette
Berthier
Maskinonge
Champlain
St. Maurice
Quebec
Portneuf
Levis
Dorchester
Beauce
Megantic
Compton
Wolfe
Richmond
Arthabaska
Drummond
Yamaska
Nicolet
Bagot
Shefford
Brome
Missisquoi
Rouville
Chambly
Vaudreuil
Soulanges
Huntingdon
Chateauguay
Napierville
Laprairie
Beauharnois
Two Mountains
Argenteuil
Montreal
Jacques Cartier
Hochelaga
Laval
Richelieu
St. Hyacinthe
Iberville
St. John
Missisquoi
Brome
Shefford
Stanstead
Compton
Wolfe
Richmond
Arthabaska
Drummond
Yamaska
Nicolet
Bagot
Portneuf
Quebec
Levis
Dorchester
Beauce
Megantic
St. Maurice
Champlain
Maskinonge
Berthier
Joliette
Montcalm
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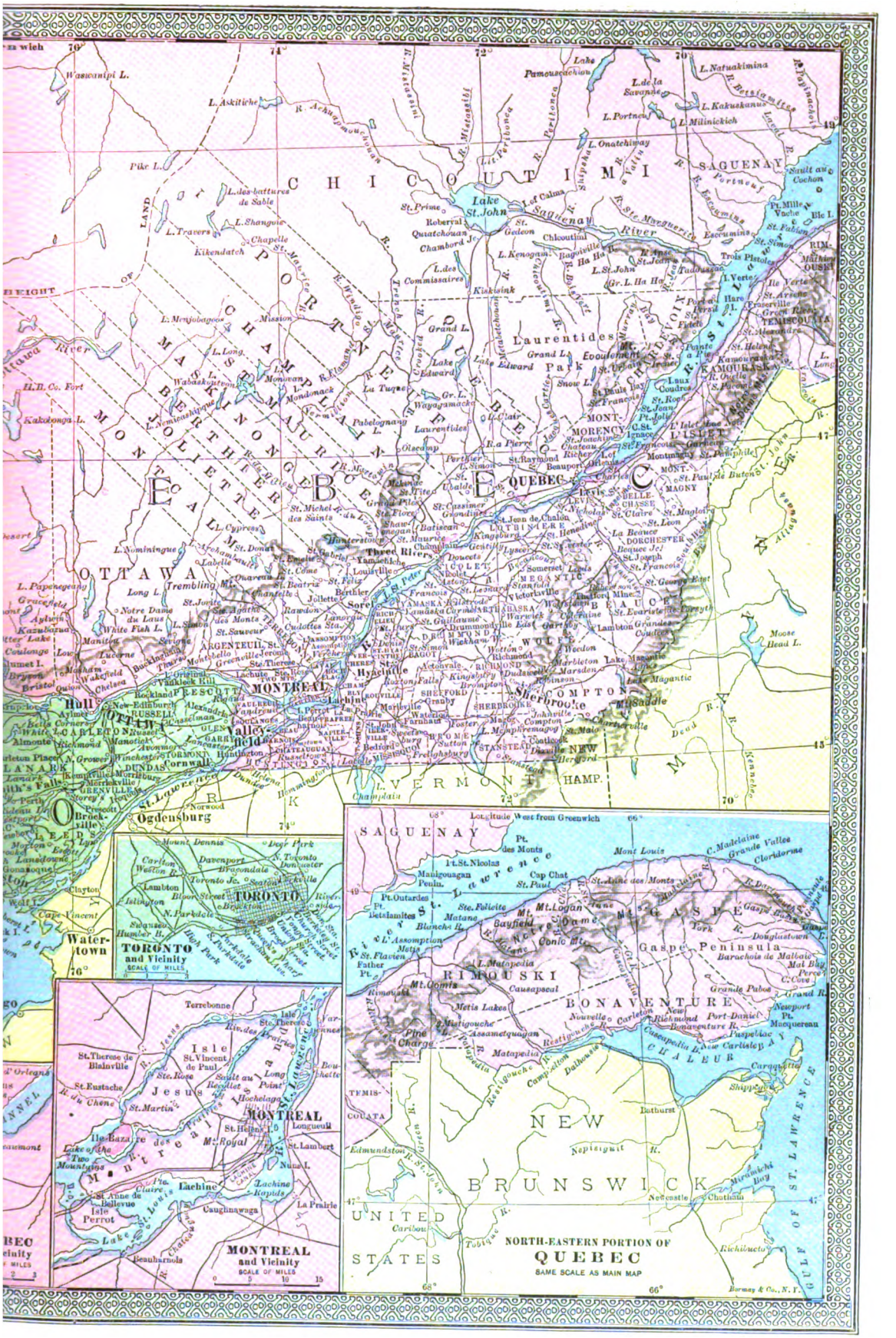
Argenteuil
Two Mountains
Vaudreuil
Soulanges
Huntingdon
Chateauguay
Napierville
Laprairie
Beauharnois
Chambly
Rouville


CHICOUTIMI
SAGUENAY
QUEBEC
MONTMORENCY
CHAMPLAIN
PORTNEUF
MAURICIE
BERTHIER
JOLIETTE
MONTCALM
TERREBONNE
OTTAWA
ARGENTEUIL
PRESCOTT
RUSSELL
CARLETON
GLENGARRY
STORMONT
DUNDAS
GRENVILLE
LEEDS
LANARK
FRONTENAC
Hull
Ottawa
Valley-field
Cornwall
Brock-ville
Water-town
Ogdensburg
Hull and Vicinity
Ottawa and Vicinity
Toronto
Toronto and Vicinity
Montreal
Montreal and Vicinity
SHEFFORD
BROME
MISSISQUOI
RICHELIEU
VERCHERES
LAPRAIRIE
HUNTINGDON
SOREL
BEAUHARNOIS
VAUDREUIL
TWO MTS.
ARTHABASKA
DRUMMOND
WOLFE
MEGANTIC
BEAUCE
DORCHESTER
LEVIS
LOTBINIERE
NICOLET
YAMASKA
RICHMOND
WICKHAM
STANSTEAD
COMPTON
Sherbrooke
Mt. Saddle
NEW HAMP.
VERMONT
Lake Megantic
Moose Head L.
Lake St. John
Saguenay River
Roberval
Chicoutimi
Kenogami
Jonquiere
Arvida
Ha Ha Bay
Tadoussac
Murray Bay
Baie St. Paul
Malbaie
Pointe au Pic
Cap a l'Aigle
Riviere du Loup
Kamouraska
Rimouski
Metis
Matane
Mont Louis
Gaspe Peninsula
Gaspe
Percé
Bonaventure
Carleton
New Richmond
Port-Daniel
Paspebiac
Chaleur Bay
Caraquette
Shippegan
Bathurst
Newcastle
Chatham
Miramichi Bay
Gulf of St. Lawrence
NEW BRUNSWICK
Edmundston
St. John
Caribou
UNITED STATES
Tobique R.
Restigouche R.
Matapedia
Matapedia L.
Pabos
Grand R.
Newport
Macquereau
Cascapedia
Escuminac
Richibucto
Shediac
Moncton
Sackville
Amherst
Pt. du Chene
Pt. Escuminac
Pt. Mille Vaches
Ile Verte
Trois Pistoles
Rimouski
Father Point
Metis Lakes
Mt. Logan
Mt. Albert
Mt. Jacques Cartier
Mt. Comis
Mt. Matapedia
Mt. Carleton
Mt. Sagamook
Mt. Bayfield
Mt. Conic
Mt. Joli
Mt. Orford
Mt. Johnson
Mt. Royal
Mt. Victoria
Mt. Murray
Mt. Pleasant
Mt. Forest
Mt. Albert
Mt. Brydges
Mt. Elgin
Mt. Vernon
Mt. Hope

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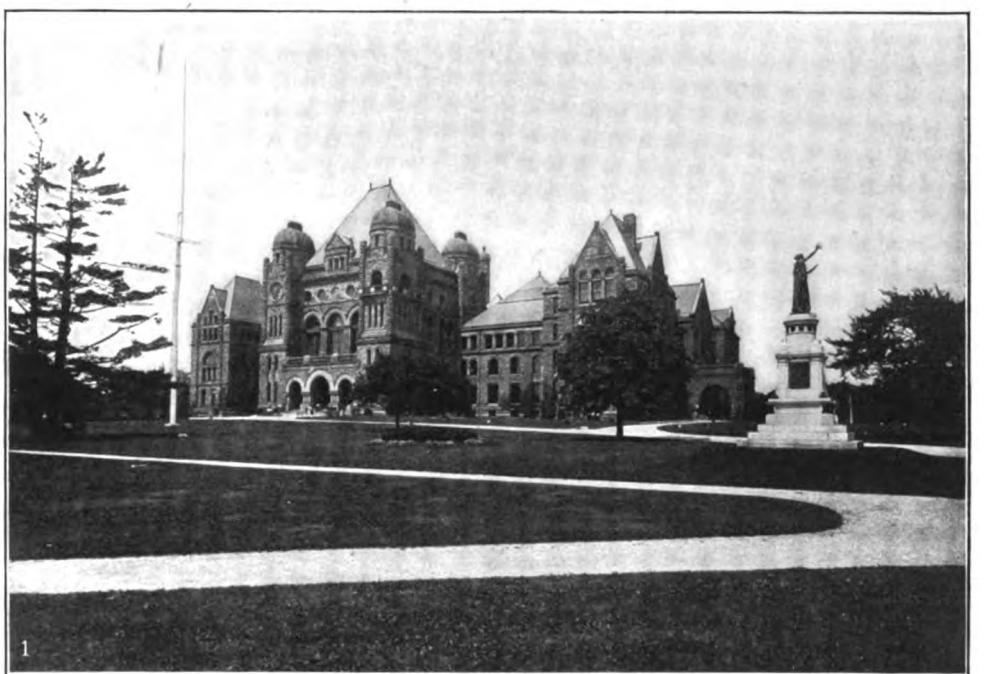

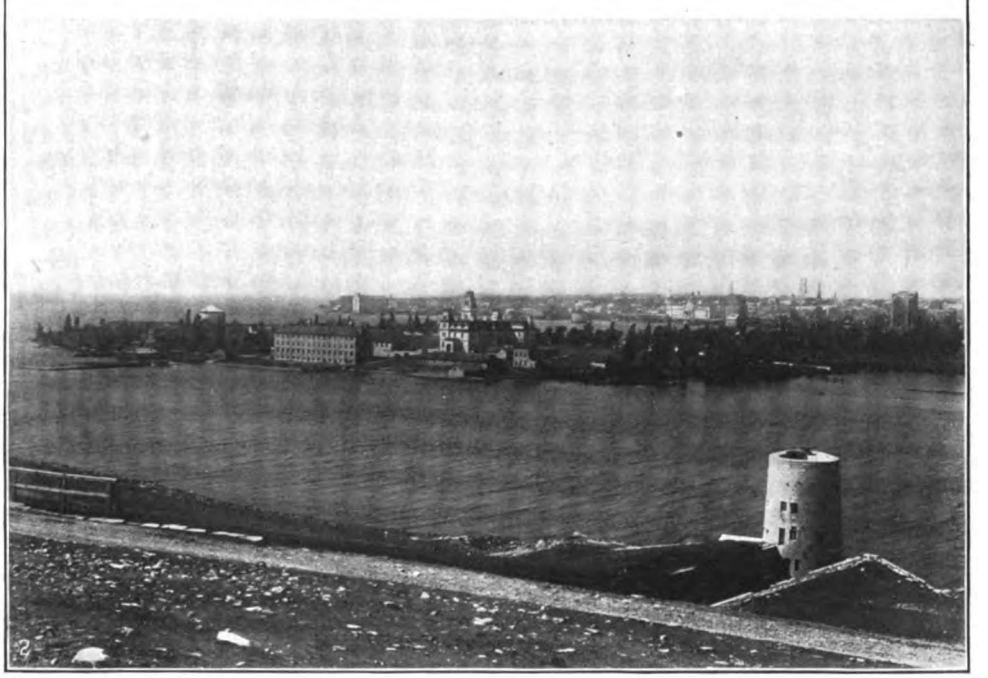

1. Parliament Buildings at Ottawa.

2. Kingston, from old Fort Henry.

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Ontario, Lake, North America, the smallest and easternmost of the five Great Lakes in the Saint Lawrence basin, forming a portion of the boundary between and partly belonging to the United States, and partly to the Dominion of Canada. It is of elongated, oval shape, 185 miles long, with a maximum central breadth of 60 miles, a circumference of about 480 miles, and an area of 7,400 square miles. Its surface level is about 334 feet below that of Lake Erie (see article NIAGARA FRONTIER), and 231 feet above the tide level of the Saint Lawrence. Its depth is said to average 490 feet; but in some places it is upward of 600 feet in depth, and it is navigable throughout its whole extent for vessels of the largest size. It receives the waters of Lake Erie through the Niagara River (q.v.) with its phenomenal falls and gorge on the southwest, and discharges at its northeast extremity through the Lake of a Thousand Isles, by the Saint Lawrence (q.v.). It also receives numerous rivers, including the Trent and Humber on its north, and the Black, Genesee, and Oswego from its southern shores. Lake Ontario has many good harbors; and as it never freezes, except at the sides, where the water is shallow, its navigation is not interrupted like that of Lake Erie. It is, however, subject to violent storms and heavy swells. It communicates by the Genesee River and Oswego Canal with the Erie Canal, and, consequently, with the Hudson River and New York city; the Niagara River and the Welland Canal, at its southwest extremity, unite it with Lake Erie, and the Rideau Canal connects it with the Ottawa at Ottawa city. Toronto, Kingston, Newcastle, and Niagara are the principal towns on the British side; and Oswego, Genesee, and Sacket Harbor on the American bank.

Ontog'eny, in biology, the individual development of an organized being, as distinguished from phylogeny. These terms were first introduced as divisions of "biogenesis."

Ontol'ogy (Greek ὀντυο-, being, and λόγος, account, science), the science of being, that is, metaphysics. Aristotle did not employ the word, but called this branch of science the "First Philosophy," defining it as the science of being, of that which exists, as far as it may be said to exist (επιστήμη τοῦ ὄντος ᾗ ὄντος), that is, the science of the essence of things; of things, not with regard to their accidents, qualities, physical or mathematical, but merely as being; the word being including not only whatever actually is, but whatever can be.

The word ontology was first introduced into philosophy by Christian Freiherr von Wolff (q.v.). He divided metaphysics into four parts: ontology, psychology, rational cosmology, and theology. Kant denied that one can have any knowledge of existences, but only of appearances or phenomena. He believed that there was a rational science of principles and causes of the principles of being and knowing, and his system of metaphysics was merely an exposition of this rational ontology. Rational ontology may be treated in two different ways according as we postulate one existence or many. If there is one existence, there must be one cause, and all phenomena are but modifications of this one existence, and effects of this one cause. This reduces metaphysics to a rational theology, the one substance or existence, and the one cause, being the Deity, the Absolute. If many existences or causes be postulated, three co-ordinate branches of inquiry are at once opened up, namely, rational cosmology, rational psychology and rational theology. These are all *a priori* investigations, and deal with essence, not phenomena; and with God as cognizable by reason in his essential nature, as distinguished from the indications and evidences given by his works. (See NATURAL THEOLOGY.) Kant's 'Kritik' is the best exposition of this view. The ontological argument for the existence of God was employed by Saint Augustine, and Boethius. It was, however, most fully developed by Anselm (q.v.) in the 11th century. Consult, Anselm, 'Proslogion'; McCosh, 'Intuition of God'; Baur, 'Dogmengeschichte.' See METAPHYSICS, TELEOLOGY.

On'yx (Greek, "finger-nail," "veined gem"), a hard variety of agate, and hence a sub-variety of chalcedonic quartz, with layers, usually curvilinear, of white, alternating with red (sardonyx), gray (chalcedonyx), black (onicolo), or green or brown. Mexican onyx is actually an aragonite and is softer than the real onyx. The true ancient onyx was much praised as a gem and particularly in making cameos. Most modern onyx, so-called, is artificially colored; Algerian onyx, for instance, being only a variety of calcite. Apart from its use in jewelry, onyx has long been used in architecture, for table-tops, columns, and, in part or entire, stair-cases, being often used with white marble. Many onyx pillars quarried in Roman times are now used in Arab mosques; and in more distinctly Occidental buildings it is sometimes used, as in the stairway of the Opéra at Paris.

Oolachan, oo'la-kan, or **Oulachan.** See CANDLE-FISH.

O'olite (Greek, "egg-stone," so called from its resemblance in size and shape to the roe of a fish), in geology a limestone characterized by the presence of minute concretionary grains or spherules, usually formed about a bit of sand or the body of a minute foraminifer; the term may also be applied to one of these tiny spheres. What may be called the Oolitic Period was marked by frequent precipitations of muddy sediment (calcareous or ferruginous) which killed and enclosed many minute organisms. This period is the later part of the Jurassic; and in England oolite limestones are so frequent and so typical of the Upper Jurassic that the Jurassic is often divided by English geologists into the Liassic Group and the Oolitic Group, and the latter subdivided into the Lower or Bath Oolite, the Middle or Oxford Oolite, and the Upper or Portland Oolite. Oolite is still in process of formation on the Florida banks.

Oology. The collecting of birds' eggs has always possessed a peculiar fascination for some men, and in the attempt to claim for their pursuit a legitimate place in scientific work they have coined for it the term Oology. A famous naturalist once said that when the oologist prepared his specimens he blew all the science out through the hole in the shell, and there is much truth in the statement. The benefit that ornithology gains from the study of a cabinet full

of empty egg-shells is so slight that it is not worth the sacrifice of bird-life that the collecting entails. While the relationship between certain groups of birds is indicated in the character of their eggs, as, for instance, between the shore-birds and the gulls and terns, nevertheless the variability, in size, shape, and color is so great, within many groups, that it is impossible to form any systematic arrangement from a study of eggs alone, and it is only now and then in connection with other characters that they prove of assistance in defining a natural arrangement of birds. The significance of their shape, colors, etc., is discussed under EGG.

In collecting eggs for scientific purposes the greatest care should be exercised in positively identifying the bird to which they belong, without which data they are absolutely worthless. The nest, which is quite as important as the eggs, should also be preserved with great care, keeping it *in situ*, if possible, and all details of its location, the date of the collecting, etc., should be recorded. The method of preparing egg-shells for the cabinet is explained in many books, and many instruments have been devised for the purpose. Suffice it to say that a round hole should be drilled with an egg-drill on one side of the egg, the size depending upon the degree of advance in incubation, and the contents should be removed by the use of a fine-pointed blow-pipe. Jets of water may be used effectively to aid in emptying the shell, and should be used in washing it out, while various chemical solvents may be of assistance in dissolving well-formed embryos. Every egg-shell should bear a number corresponding to its record. Directions for the collection, preservation and care of birds' eggs are published by the Smithsonian Institution.

Probably the finest illustrated work on the oology of any region is Bendire, 'Life Histories of the Birds of North America' (1892; unfinished). Other works are: Lefevre, 'Atlas des Œufs des Oiseaux d'Europe' (1845); Hewitson, 'Eggs of British Birds' (1856); Bädeker, 'Die Eier der Europäischen Vögel' (1863); 'Des Murs Traité général d'Oologie Ornithologique' (1860).

WITMER STONE,
Academy of Natural Sciences, Philadelphia.

Oo'ri, or **Uri.** See LIMPOPO.

Oo'rial, Urial, or **Sha,** a large wild sheep (*Ovis vignei*) of the high Himalayas and Tibetan plateaus and eastward to Persia, the chase of which calls for the greatest endurance, skill and resolution on the part of hunters. The rams have immense, rounded, coiling horns; and both sexes vary much in color, and are in the habit of wandering widely.

Ootacamund, oo-tă-kă-mŭnd', India. See UTAKAMAND.

Ooze, fine sticky mud, almost entirely of organic origin, covering great parts of the sea-floor, and constituting one of the most important of the Oceanic Deposits (q.v.). The various oozes are made up mostly of the remains of various foraminifers, and hence furnish a valuable means for the study of deep-sea micro-organisms, even apart from their role in the building up and strewing over of ocean beds. According as one variety or another of organic remains predominates or occurs characteristically, the oozes are usually classified as Globigerina ooze, Pteropod ooze, Diatom ooze and Radiolarian ooze. But it must be borne in mind that no one ooze consists entirely of any one sort of the foraminifers mentioned. The division mentioned is, moreover, logically a secondary division, since we may speak of the calcareous oozes (including the Globigerina and the Pteropod) and the silicious (including the Radiolarian and Diatom oozes), a more suggestive classification, though still one that is based only on predominant characteristics, since the Globigerina ooze, for example, is never free from silicious organisms. Murray says that the silicious element even here varies from "traces" to 20 per cent. But the Globigerina ooze usually averages 40 per cent of carbonate of lime, sometimes reaching 95 per cent, and its most characteristic component is the foraminifer *Globigerina*, besides which it contains other pelagic *Foraminifera*, as *Pulvinulina*, *Orbulina*, etc. The predominant color is pale gray, with occasional red and brown tints due to the peroxides of iron or manganese. The Globigerina ooze occurs near the equator both in the Atlantic and Pacific and in the western and southern Pacific; a special variety of it marked by the presence of comparatively fewer rhizopods and more pteropods and heteropods, though these latter shells never predominate, is found in tropic depths of less than 2,000 fathoms, near the Fiji Islands and elsewhere in the Western Pacific, and is called Pteropod ooze. *Radiolaria* occur both in the Globigerina ooze and in the Diatom ooze, but where they predominate the ooze is named from them; a great strip of this silicious mud spreads between 15° N. and 10° S. to 140° E. and 150° W. in the Pacific. The color is reddish and brownish because of the presence of manganese and iron; the composition otherwise is mainly silicious, though as much as 20 per cent of carbonate of lime may occur. The other silicious variety is marked by the presence and predominance of Diatoms, with occasionally 25 per cent of Globigerina shells and other calcareous matter. Its color is that of pale straw, and, when dried, dirty white. These various classes merge into each other on the ocean bottom, and there is no hard and fast line between them. Their deposit has been slow and continuous and apparently not such as to effect continental areas, or even, markedly sea depths. See OCEAN DEPOSITS. Consult Murray, 'Challenger Reports — Deep Sea Deposits' (1891). See GLOBIGERINA.

Opa'cite, in mineralogy, black opaque grains or scales, usually of minute size, found most commonly with magnetite. They are incapable of microscopic identification and seem to vary in composition, some being graphitic, and others metallic oxids or silicates.

O'pah, King-fish, or **Sun-fish,** a large and beautiful sea-fish (*Lampris luna*) of the dory family, a native of the Eastern seas, but found in the Atlantic and Arctic oceans, and, rarely, on the North American coasts. It is about 4½ feet long and weighs 140 to 150 pounds. Its colors are very rich, the upper part of the back and sides being green, reflecting both purple and gold, and passing into yellowish-green below, the fins bright vermilion. The body is oval and laterally compressed, and the scales are small. It has a single dorsal fin and a forked tail. It is believed to feed on cuttlefish and similar animals. The flesh is highly esteemed.

O'pal, hydrated amorphous silica, used as a gem-stone even in ancient times, when it was supposed to have magical virtues, as of making its possessor invisible if he carried it wrapped in a bay leaf, or of making him generally beloved so long as he trusts in its virtues. From the point of view of the mineralogist the opal is remarkable as never occurring in crystal form, and as differing from quartz only in having 3 to 13 per cent of water in its composition. Its fracture is conchoidal, and occasionally very perfect; its lustre vitreous, pearly, or sometimes resinous; its color variable, white, red, yellow, green, gray, and blue, occurring; its density 1.9 to 2.3, and its hardness 5.5, that is, less than quartz; it is perfectly soluble in hot caustic potash, another dissimilarity between it and quartz; and it is infusible by the blow-pipe. The principal varieties of the opal are: the *precious opal,* with splendid coloration due to fine fissures, varying from translucent to transparent, and occurring, especially, near Czarwenitza, Hungary, and in Australia, in conglomerate, basalt, or porphyritic quartz. Its color varies with climate and temperature, and sometimes disappears permanently, the opal then being called «dead.» The stone is not cut, being too brittle, but is set *en cabochon.* The variety usually called Mexican is actually a sub-variety of the precious opal, occurs in Guatemala, the Faroe Islands, and in southern Australia, and should not be confused with the *fire opal,* which is the commonest opal of Mexican provenance, occurring there at Zunapan, and in Washington County, Ga., as well as in the Faroe Islands. It is a hyacinth red. The *girasol* is a Mexican and Central American variety with bluish tinge and red reflections. The *common opal* is widely distributed, has a great range of colors like the more valuable varieties, and differs from them in having neither reflections nor color-play; it is found at Leisnig, Saxony, at Kosemitz, Silesia, at Dubnik, Hungary, in the Faroe Islands, in Iceland, and in America at Cornwall, Pa., Idaho Springs, Colo., and Calaveras, Cal. *Semi-opal* is more opaque than common opal, with which it often occurs, as well as in company with chalcedony; it sometimes is considered to include *wood-opal,* which resembles petrified wood in its origin, but has the peculiar marking of the opal. A forest of opalized wood was discovered in Montana in 1903. Inferior varieties are *hydrophane,* which is transparent only in water; *mother-of-pearl opal,* used, especially when found with chalcedony, for cameos; *glass-opal* or *hyalite,* made up of glassy concretions; and *melinite,* a gray, tuberous or reniform mass.

Opata (ō'pä-tä) **Indians,** a tribe of American Indians living in the Mexican state of Sonora. They have long been Christianized, are a quiet and industrious people, and are devoted to agriculture. They are found chiefly in the central parts of the state, where they are domiciled in villages. This mode of life has given them a fairer complexion than that of the Indians who dwell entirely in the open air. They are the only Indians who have successfully contended with the savage Apaches. On many occasions they have aided the Mexican government in fighting other tribes. They number at the present time about 5,000.

Opechancano, ō-pĕch-an-kä'nō, an American Indian chief of the Powhatan confederacy of Virginia. He died in 1648 after a very strenuous career. Under cover of being friendly to the English he united all the tidewater tribes in Virginia, and 22 March 1622 an attack was made on the colonists. Over 400 men, women and children were massacred. After a long term of peace, Opechancano again attacked the English in 1644 and 300 persons were put to death. The chief was afterward captured and was shot at Jamestown by a sentry appointed to guard him.

Opelika, ŏp-ę-lī'ka, Ala., city, county-seat of Lee County; on the Central of Georgia and Western of Alabama R.R.'s; about 60 miles in direct line west by north of Montgomery. It was settled in 1839 or 1840. It is in an agricultural region in which cotton is one of the chief products. The principal manufactures are cotton products, brick, fertilizers, flour, and lumber. It has considerable trade in its manufactures and the farm products of the surrounding region. Pop. (1890) 3,703; (1900) 4,245.

Opelousas, ŏp-ĕ-loo'sąs, La., town, county-seat of Saint Landry County; on the Bayou Teche, and on the Southern Pacific railroad; 55 miles west of Baton Rouge. It is the trade centre of a cotton, rice, and live stock raising district, and contains a cotton compress and a cottonseed-oil mill. It has a high school and the Academy of the Immaculate Conception (Roman Catholic); the high school has a free library of over 1,000 volumes. Pop. (1900) 2,951.

Open-bill, an African bird (*Anastomus lamelligerus*) of the stork family, so named from the odd formation of the beak, which at the anterior end exhibits a gap between the mandibles; it also is furnished with lamellations forming a sifting apparatus analogous to that of the bills of ducks. Another species (*A. oscitans*) inhabits the East Indies. The beak is yellow, and the general plumage black with dashes or suggestions of green and purple throughout. The open-bills are also called shell-storks or shell-ibises on account of their ordinary food, which consists of mollusks.

Open Door, The, a term of diplomatic significance applied to the unrestricted maintenance of international commercial relations. It came into general use in the 19th century in regard to conditions in Eastern Asia, and indicates an arrangement binding by general consent rather than by treaty, whereby all nations are allowed to trade in China and its dependencies upon equal terms. The European Powers controlling spheres of influence in the Chinese Empire tacitly admit foreign traders into their spheres on the same conditions as traders of their own country. This agreement, so far as the United States and other Powers are concerned, places China, commercially, in the same relation to the rest of the world that she had before the spheres of influence were recognized. Her tariff rates are to be uniform to all nations with which she enjoys trade treaties. The Powers on their side, agree to respect existing treaties, a condition of considerable importance to the expansion of commerce in that of the United States in particular. See articles on TREATY PORTS: AMERICAN EXPORTS AND IMPORTS; FOREIGN TRADE; FREE TRADE; TRADE; TARIFF.

Opequon, ō-pĕk'an, Battle of the (also called the Battle of Winchester). On the night of 18 Sept. 1864 Gen. Early had Ramseur's division and Nelson's artillery in position about 1½ miles east of Winchester, Va., across the Berryville road, along an elevated plateau between Abraham's Creek on the south and Red Bud Run on the north. Rodes' and Wharton's divisions, with Braxton's and King's batteries were at Stephenson's Depot, and Gordon's division at Bunker Hill, under orders to join Rodes and Wharton by sunrise next morning. Cavalry picketed the Opequon and the roads northward and westward on the left, and on the right along the Millwood and Front Royal roads to the Shenandoah. Early had about 15,000 men. Gen. Sheridan, with about 38,000 cavalry and infantry, was at Berryville, east of the Opequon. He had ordered a movement south of Winchester to Newtown, but when he heard that parts of Early's army were at Bunker Hill and Stephenson's Depot, ordered a direct attack on Winchester. Wilson's cavalry division, followed by the Sixth and Nineteenth corps, was to move on the Berryville road, while Torbert, with Merritt's cavalry division, moved to Stephenson's Depot, to join Averell's cavalry division, which was to move up from Darksville. Crook's Eighth corps was to be in reserve at the crossing of the Opequon. Early on the morning of 19 September Wilson was on the road, crossed the Opequon and cleared the way for the infantry. The Sixth corps came up and, under a heavy artillery fire formed line in front of Ramseur, its batteries replying to those of the Confederates. Wilson formed on the left of the Sixth corps. It was nearly noon before Grover's division of the Nineteenth corps was formed on the right of the Sixth, with Dwight's division in reserve. Meanwhile Early had concentrated his army. When Wilson drove in his cavalry pickets on the Opequon at daylight, and the Union movement developed itself, he ordered Gordon and Rodes from Stephenson's Depot, and both arrived before the Union lines were formed, and took position on Ramseur's left, under cover of a piece of woods, Gordon being on the left of Rodes, who had three brigades. At near noon the Union line moved forward; Nelson's artillery on the Confederate right and Braxton's on the left opened a destructive fire; Early ordered Rodes and Gordon to advance from the woods and attack the Union right; and the two lines met in a deadly struggle. Ramseur and Rodes were driven steadily back by the Sixth corps, and Grover's division of the Nineteenth struck Gordon's left, held by Evans' brigade, and drove it back in disorder through the woods from behind which it had advanced. Grover followed to the very rear of the woods, and to within musket-range of Braxton's artillery, which was without support; but Braxton's guns stood to their ground and opened with canister, which checked Grover's advance; and at this moment Battle's brigade of Rodes' division came up, moved forward through the woods, and striking a weak point in the Union line, where the right of the Sixth corps joined the left of the Nineteenth, and joined by the rallied brigades of Rodes' and Gordon's divisions, drove back Ricketts' division of the Sixth corps and Grover's of the Nineteenth, and caused the remainder of the deployed line of the Sixth corps to fall back to the ravine from which it had advanced. But while the Confederates were pursuing Grover, Russell's division of the Sixth corps, which was in second line, charged forward to fill the gap made by the withdrawal of Ricketts, and struck the Confederates in flank, driving them back with heavy loss, and the Union line was re-established, and there was a comparative lull in the engagement, which had been very bloody, and in which Gen. Rodes, one of Early's best division commanders, and Gen. Russell, one of Sheridan's best, had been killed. Crook's Eighth corps, which had been intended to be used on the left to seize the Valley pike south of Winchester, was now brought to the right and its two divisions, forming on the right of the Nineteenth corps, charged and broke Gordon's division. Meanwhile Wilson's cavalry on the left had driven Lomax's cavalry back toward the Valley pike. On the right Merritt's cavalry division, after severe skirmishing, had crossed the Opequon at three fords near the railroad crossing, but was quickly held in check by Wharton's division of infantry and King's battery, which had advanced from Stephenson's Depot to meet it. A severe contest ensued, lasting some hours, both sides gaining and losing ground; but Averell, moving up the pike from Darksville to Stephenson's, driving two cavalry brigades before him, came into the rear of Wharton, while he was engaging Merritt, causing him to abandon his position and fall back at 2 P.M. to Winchester, where two of his brigades were put in reserve, in rear of Rodes' division, one remaining to support the cavalry north of the town. Merritt now advanced and joined Averell, and both moved down on Early's left, driving back the Confederate cavalry, until Merritt joined the right of Crooks' troops. Averell and Merritt swung around to the rear of Early's left, driving his cavalry through the infantry lines and compelling him to send two of Wharton's brigades to check them. Crook, who had driven Gordon, now advanced on Wharton's flank and was himself struck by a flank fire. Early was now obliged to yield ground. The Sixth and Nineteenth corps were steadily driving Ramseur's and Rodes' divisions back to Winchester, and Averell's and Merritt's cavalry divisions were charging around his left flank, forcing back his cavalry in some confusion, and attacking his infantry, taking many prisoners from both, until finally, after an unsuccessful effort to hold an intrenched position covering the town, his road to Newtown being threatened, the whole line gave way and retreated, near sundown, some of it in confusion and disorder, some of it in an orderly manner, followed by Sheridan's cavalry to Kernstown, where Ramseur, who was rear-guard, checked pursuit at dark. Early halted at Newtown at midnight, and next morning continued his retreat through Strasburg to Fisher's Hill, Sheridan following to Cedar Creek. The Union loss at the battle of the Opequon was 697 killed, 3,983 wounded, and 338 missing, an aggregate of 5,018. The Confederates lost 276 killed, 1,827 wounded, and 1,818 missing, an aggregate of 3,921. They lost also five guns and nine colors. Consult: 'Official Records,' Vol. XLIII.; Pond, 'The Shenandoah Valley in 1864'; Sheridan, 'Personal Memoirs,' Vol. II.; Early, 'A Memoir of

the Last Year of the War for Independence'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV.

E. A. CARMAN.

Opera, from the Italian signifying a composition or musical work, is a musical drama, or as the Italians, the originators of the modern opera, term it, *dramma per musica.* In opera or musical drama, music enriched by the accessories of instrumental accompaniment, costumes, scenery, dancing, etc., is an essential part of the work distinguishing it from ordinary drama accompanied by music. According as the serious or comic quality prevails in the opera, it is termed *opera seria* or *opera buffa.* There is also a style — *mezzo stilo* or *semi-seria* — between both, the limits of which it is practically impossible to define. The component parts of an opera are recitatives, solos, duets, trios, quartets, etc., choruses, and they are usually preceded by an instrumental overture, containing a characteristic blending of the principal themes or *leit-motiven* throughout the opera.

French *opéra comique* and *vaudeville,* the *operetta* of Great Britain, and the United States, the German *singspiele,* and the Spanish *zarzuela,* are short musical dramas of a lighter and mixed character — partly spoken and partly sung; they are in direct contrast to the melodrama of German origin, in which music is introduced either by itself or in connection with the dialogue, no singing, however, takng place.

Grand opera is confined to music and song with scenic accessories, the *recitative* or *recitativo* (q.v.) being an essential part of the music. While the opera remains a drama and should never lose this character, song and music may be considered its poetical attributes, the lyric quality of the music being principally directed to the expression of feelings and passions, as comparatively little display of character and action can be expected from opera. An opera, like every work of art, must bear the stamp of unity; one characteristic must prevail through the whole, as the solemn or grave in Mozart's 'Magic Flute,' notwithstanding various naïf passages, the vivid coloring of 'Figaro,' the sublime elevation of Gluck's 'Alceste,' and the heroic in Wagner's various "music-dramas" — as he preferred to call them.

The opera proper is of modern date and Italian origin. The ancient Greek dramas were operatic in character, and the attempts to reproduce the wonderful effects of old Greek music,— confused remembrances of which lingered along the Mediterranean littoral during the Dark Ages, — and to break the fetters of over-elaborated counterpoint, are perceived in the middle of the 16th century by the efforts of Willaert, De Rore, Vincentino, and Venosa to introduce *chromatics* (q.v.), or an intensification of expression, heedless of old rules. About 1600 a powerful impulse was given to music generally by the renaissance and vogue of *monody* with instrumental accompaniment in chords for dramatic singing (*stilo rappresentativo*), whence sprang opera. Earlier symptoms of this musical development and renaissance, however, may be found in the mysteries of the Middle Ages. These pieces frequently had songs introduced into them and sometimes toward the close of the period of their prevalence, whole pieces were sung or rather chanted. The first piece performed in this way was 'The Conversion of Saint Paul,' produced in 1440. In 1508 a piece called 'Calandra,' set to music, was performed at Urbino, and in 1514 the same piece was performed before Leo X. at Rome. Several years later, the father of the astronomer Galileo produced at Florence his 'Ugolino,' a kind of lyric drama, closely resembling the modern opera, the subject of which was taken from a well-known episode in Dante. About this period, however, pastoral dramas, in which only the prologues and choruses were sung, almost entirely displaced all other modes of theatrical representation, and as already stated, it was not till near the close of the 16th century and about the commencement of the 17th century, that the invention of monody and recitative or spoken music came in to complete the Italian opera. About this time three young noblemen of Florence, who were attracted to each other by a similarity of tastes and pursuits, a love of poetry and music, and are known to posterity as *La Camerata,* conceived the idea of reviving the chanted declamation of the Greek tragedy. They induced the poet Rinuccini to write a drama on the story of Daphne, which was set to music by Peri and Caccini, the most celebrated musicians of the age, assisted by Count Giacomo Corsi, who, though only an amateur, was also, for the period, a good musician. The piece was performed privately in the palace of Corsi; the interlocutors or singers being the author and his friends; the orchestra of this first opera consisted of four instruments, a harpsichord, a harp, a viol di gamba, and lute. There was no attempt at airs, and the recitative — if such it could be called — was merely a kind of measured intonation, which would appear to us insufferably languid and monotonous; yet at the time of its production in 1595 it created an extraordinary sensation, and was frequently repeated. Five years later, 6 Oct. 1600, the first public opera, entitled 'Euridice,' written by the same poet, and with two different musical settings by the same musicians, Peri and Caccini, appeared, both settings being received with equal favor on their production in the Pitti Palace, Florence, during the festivities connected with the marriage of Maria de' Medici with Henry IV. of France. The introduction of Anacreontic stanzas, set to music, and a chorus, at the end of each act were the first imperfect indications of the airs and choruses of the modern opera. Monteverde (q.v.), a Milanese musician, improved the recitative by giving it more flow and expression, and is the first master who displayed genius in operatic composition; he is regarded also as the father of the art of instrumentation. For the court of Mantua, he composed the music to the opera of 'Ariadne,' by Rinuccini (1608); having the year previously produced the brilliant success 'Orfeo.' At Rome, the first performances of *opera seria,* consisting of scenes in recitative and airs, were given from a cart during the carnival of 1606 by the musician Quagliata and four or five of his friends. The first regular serious opera was performed at N[redacted] in 1615; it was entitled 'Amor non ha [redacted] ('Love not Bound by Law'). The fir[redacted] *buffa* is said to have been represented a[redacted] in 1624, where also the first stage for op[redacted] erected in 1637.

In the opera 'Giasone,' set by Cava[redacted] Cicognini, for the Venetians (1649), occur the

first airs connected in sentiment and in spirit with the dialogue, opening a new path for opera in which the first bright star is Alessandro Scarlatti, the composer of over 100 operas, the chief of which are 'La Rosaura' (1690); 'Teodora' (Rome 1693), in which Scarlatti first introduced the *da capo* of the grand aria, and replaced *secco recitativo* by *recitativo accompagnato*; 'Pirro e Demetrio' (Naples 1694); 'Laodicea e Berenice' (1701); 'Tigrane' (1715); and 'Griselda' (1721). During the latter half of the 17th century, however, opera did not improve but degenerated in Italy, becoming what it was in France later, during the 18th century, a grand spectacle addressed to the eye, in which the poetry and music were the last things considered, while the scenery, mechanical illusions, and pantomime were on the most splendid scale. As Goldoni said long afterward of the grand opera at Paris, "C'etait le paradis des yeux et l'enfer des oreilles." (It was paradise to the eyes, and hell to the ears).

Meanwhile opera had been transplanted to France, to Germany, and to England. In France arose Lully, whose chief operas are 'Cadmus et Hermione,' to the libretto of Quinault (1673); 'Alceste' (1674); 'Thésée' (1675); 'Atys' (1676); 'Isis' (1677); 'Psyché' (1678); 'Bellerophon' (1679); 'Proserpine' (1680); 'Le Triomphe de l'Amour' (1681); 'Persée' (1682); 'Phaëton' (1683); 'Amadis de Gaule' (1684); 'Roland' (1685); 'Armide et Renaud' (1686); 'Acis et Galatée' (1687). In Germany arose Keiser with 116 operas, the most popular of which are 'Störtebecker und Goedje Michel'; 'Die Leipziger Messe'; 'Der Hamburger Jahrmarkt'; 'Die Hamburger Schlachtzeit.' In England, Purcell originated a national opera with 40 stage-works, chief of which are 'King Arthur,' text by Dryden (1691); and 'The Faerie Queene' (1692). Outside Italy these are the chief operatic composers of the second half of the 17th century. In the 18th century Handel appeared, and settling in England, by his long list of stage-works, too numerous to detail here (see his biography), effected a complete revolution in English opera, but did not exert a permanent influence, his forte finally discovering itself in oratorio. After Handel, Arne (30 operas), and Shield, are the chief of the English operatic composers of the century, although the first genuine English opera to attain popularity was 'The Beggar's Opera' (1728), set to Gay's libretto by Pepusch. The creation of *opera buffa* (1751), by Pergolesi, 'Serva Padrone,' and 'Mæstro di Musica,' and by Logroscino, 'Il vecchio marito,' 'Tanto bene tanto male,' and 'Il governatore,' in opposing itself to the mere manufacture of operas on antique subjects, rejuvenated and revived Italian opera; Cimarosa and Paesiello followed in their footsteps, while in France *opéra comique*, first called *opéra buffon* (1752), had its representatives in Duny, Gossec, Monsigny, Phillidor, etc., and in Germany appeared the *singspiele* of Hiller, Schenk, and [redacted] Italian opera did not penetrate into [redacted] until the second half of the 18th century. [redacted] period also, Gluck appeared in Germany, [redacted]se an influence on *opera seria*, which has [redacted]holly ceased. At this time the dramatic [redacted] was apt to be sacrificed to the musical, [redacted]e opera had degenerated to a mere collection of songs connected by recitatives. Gluck endeavored to make the opera a well-balanced whole in which the music should be subservient to the action of the drama, though he by no means discarded appropriate airs, and introduced also appropriate choruses and other connected pieces.

The Italians draw the line between the *opera seria* and the *opera buffa* much more distinctly than the Germans, so that Italian *opera seria* appears almost insipid to a German; the *buffa*, on the contrary is quite national, and produces a lively effect, when played by Italians. What has been called the romantic opera is of German introduction. In it comic or light and amusing scenes alternate with those of a more serious cast. It was Mozart who brought this class of opera to perfection, and his 'Don Giovanni,' 'Magic Flute,' and 'Mariage de Figaro' are unsurpassed, perhaps are unsurpassable in their genre. Beethoven's single opera, 'Fidelio,' in some respects may be said to stand alone. But at the head of the modern school of German operatic composition stands Richard Wagner (q.v.), whose master-mind raised romanticism to its highest power, and while enriching the means of musical expression in an unparalleled manner, accomplished a reaction against the overgrowth of the melodic element similar to that of the Florentines and of Gluck, depriving the vocal music of the piece of the prominent place formerly assigned to it, and making it subordinate to the other three elements of an opera — text, instrumentation and scenic decoration. His *magnum opus* is the magnificent tetralogy, 'Der Ring des Nibelungen,' comprising a sequence of four musical dramas, 'Das Rheingold,' 'Die Walküre,' 'Siegfried,' and 'Götterdämmerung,' first performed entire at Baireuth in 1876. Other notable works are 'Tannhäuser,' 'Lohengrin,' and 'Parsifal.'

The chief Italian operatic composers include, besides those already mentioned, Sacchini, Piccini, Buononcini, Porpora, Jomelli, Cherubini, Rossini, Bellini, Donizetti, and the versatile mæstro Verdi, whose 'Otello' (1887) and 'Falstaff' (1893) may be said to be up to the present time the last of the *chef-d'œuvres* of opera. Among contemporaneous Italian composers are Boito, Puccini, Franchetti, Giordano, Spinelli, Mascagni, and Leoncavallo. The German composers besides Gluck, Mozart, Beethoven, and Wagner, include Handel, Hasse, Theile, J. W. Franck, Keiser, Mattheson, Telemann, Weber, Spohr, Flotow, Marschner, Lortzing, Cornelius, Nicolai, Johann Strauss, Von Suppé, etc., and among contemporaneous celebrities are Richard Strauss, D'Albert, Bungert, Humperdinck, Goldmark, Schillings, Kienzl, Weingartner, Siegfried, Wagner, and others. Meyerbeer, though German by birth, belongs rather to the French school, the chief representatives of which are Grétry, Monsigny, Méhul, Le Sueur, Boieldieu, Auber, Berlioz, Halévy, Herold, A. Thomas, Gounod, Saint-Saens, and César Franck (a Belgian). Among the composers of French *opéra comique* are Offenbach, Lecocq, Bizet, Hervé, Planquette, Audran, Delibes, Massé, Massenet, De Joncières, Bruneau, Charpentier, D'Indy, and Lalo. Among Russian operatic composers are Borodin, Cui, Glinka, Rimsky-Korsakoff, Rubinstein, and Tschaikowsky. Poles are represented by Scharwenka, Moritz, and Paderewski; Bohemians by Smetana and Dvorak. In the British school of

modern opera are Balfé, Wallace, Benedict, Macfarren, Sullivan, Mackenzie, Thomas, Cellier, Stanford, and MacCunn. Chief of these is Sir Arthur Sullivan, whose operatic fame rests on a long list of *opera buffa*, composed to the sparkling *libretti* of W. S. Gilbert, his *opera seria*, the 'Golden Legend,' and scholarly 'Ivanhoe,' not meeting with the success due to their merits.

Italian opera was first introduced into the United States in the autumn of 1825, when Garcia's daughter, afterward famous as Malibran, appeared in Rossini's 'Barber of Seville,' at the Park theatre in New York. Among the earliest attempts to create an American national opera were those of Luigi Arditi and Max Maretzek who, about 1856 and subsequently, produced 'Rip Van Winkle,' 'The Spy,' 'Sleepy Hollow,' and 'Uncle Tom's Cabin,' described as "the four best American operas ever written," which "had they been first brought out in Paris or London would have become popular there, and would have been imported to this country with a flourish of trumpets." To these may be added 'The Scarlet Letter' of Walter Damrosch. The modern native productions of *opera buffa* partake more of the character of musical farces; notable exceptions are the works of Reginald de Koven and Victor Herbert, due chiefly to the clever *libretti* of H. B. Smith.

Consult: Apthorp, 'Opera, Past and Present' (1901); Elson, 'A Critical History of Opera' (1901); Streatfield, 'The Opera' (1901); Upton, 'The Standard Operas' (1891).

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Editorial Staff, 'Encyclopedia Americana.'

Opera Bouffe (boof), a farcical form of opera in which the characters, subject-matter, and music is intended to burlesque the more serious style of opera. Pergolesi was the creator and Offenbach the chief master in this art. The comic operas of Gilbert and Sullivan, both in the character of the music and the libretti, stand by themselves. Comic opera is the generally accepted present day term for opera bouffe.

Opera-glass (Fr. *lorgnette*), a double telescope, used for looking at objects that require to be clearly seen rather than greatly magnified, such as adjoining scenery and buildings, the performers at a theatre or opera, etc. The opera-glass is short and light, and can be easily managed with one hand. Its small magnifying power (from two to three at the most), and the large amount of light admitted by the ample object-glass, enable it to present a bright and pleasant picture, so that the eye is not strained to make out details, as in telescopes of greater power, which generally show a highly magnified but faint picture. It allows the use of both eyes, which gives to the spectator the double advantage, not possessed by single telescopes, of not requiring to keep one eye shut (a somewhat unnatural way of looking), and of seeing things stand out stereoscopically as in ordinary vision.

The opera-glass is the same in principle as the telescope invented by Galileo. It consists of two lenses, an object-lens and an eye-lens. The object-lens is convex, and the eye-lens concave. They are placed nearly at the distance of the difference of their focal lengths from one another (see TELESCOPE). The opera-glass need not be set to a precise point, as is necessary with ordinary terrestrial telescopes, for the lengthening or shortening of the instrument does not produce so decided an effect on the divergence of the light; the change of divergence caused by screwing the opera-glass out or in is so slight as not much to overstep the power of adjustment of the eye, so that an object does not lose all its distinctness at any point within the range of the instrument. There is, however, a particular length at which an object at a certain distance is most easily looked at. The two telescopes of the opera-glass are identical in construction, and are placed parallel to each other. The blending of the two images is easily effected by the eyes, as in ordinary vision. The cheapest opera-glasses consist of single lenses; those of the better class have compound achromatic lenses. A very ordinary construction for a medium price is to have an achromatic object-glass, consisting of two lenses, and a single eye-lens. In the finest class of opera-glasses, which are called field-glasses, both eye-lenses and object-lenses are achromatic. Plössl's celebrated field-glasses (Ger. *Feldstecher*) have 12 lenses, each object-lens and eye-lens being composed of three separate lenses. See LENS; OPTICS; TELESCOPE.

Opera'tions, Dental. See DENTISTRY.

Operations, Military. See MILITARY SCIENCE; TACTICS, etc.

Operations, Surgical: Measures other than medical for relief of conditions resulting from disease or accident, and generally involving the use of cutting instruments or of apparatus. Surgical operations include those mentioned below.

Reduction of Fractures.—This process consists in so manipulating the fragments of bone as to bring them into proper position and free them from intervening tissue, and then, by immovable apparatus, retaining them in position till union takes place from the growth of new bone or of ligament. Flat or rounded splints of wood, of sole-leather, of prepared felt, or of pasteboard are used, or bandages impregnated with silicate of soda (water-glass), or with plaster of Paris.

Reduction of Dislocations.—The displaced bone is manipulated by the surgeon in such a way as to force it to re-enter its socket through the tear made in its capsular ligament in its exit. Leverage is used, with a hand or foot or opposing muscles as a fulcrum, and retaining apparatus is applied to secure rest till swelling and other inflammatory symptoms cease.

Amputations and Disarticulations.—Amputations consist in the removal with the knife of some part of the body, as an arm, a breast, etc. In the amputation of a limb, the soft parts, after being cut through, are retracted so as to allow the bone to be sawed off as far back in the flesh as possible. This procedure provides, after tying all bleeding arteries and cleansing the surfaces, for covering in the bone deeply with muscle and skin flaps. Before beginning the amputation of a limb, a tight rubber band is applied about it, so as to prevent hemo[redacted] when the arteries are severed. After th[redacted] tied, the band is removed. A disarticu[redacted] an amputation through a joint. Skin a[redacted] flaps are provided, and the bone's end[redacted] covered. In all amputations of limbs the [redacted] is so done that the scars resulting shall not be located so as to prevent the adjustment of an

artificial limb. Many ingenious amputations of special parts of the body have been devised, as of the foot. In one of these, parts of two bones are removed, and the remnants are brought into apposition, so that they unite. This is termed osteoplasty.

Ligation of Arteries.—This is an important and very frequent procedure in surgical operations. An artery may be tied in continuity in cases of hemorrhage, or aneurism, etc. In such cases the artery is exposed and a blunt-end needle, with an eye near its tip, is loaded with the chosen ligature, and hooked under the vessel. The ligature is caught by the surgeon with a forceps, and pulled through while the needle is withdrawn. The ends of the ligature are then tied above the artery. An artery may be tied when bleeding in the stump of an amputation. Catgut, silk, kangaroo tendon, and silkworm gut are the chief varieties of ligature used. An artery is sometimes held with pins thrust through the adjacent flesh, so as to compress the vessel (acupressure), or it may be closed by being twisted at its extremity (torsion).

Excision and Resection.—Excision is the removal of a portion of the body by cutting it from the surrounding tissues. If a portion of bone or a joint be removed, the operation is termed a resection. Excision may be desirable in the case of a tubercular joint or a necrotic bone, or in hip-joint disease, for example.

Besides these general measures, many special operations are performed. These include, beside many others, those mentioned below:

Plastic Operations Upon the Face.—In these, skin from forehead or cheeks is taken to repair, for example, a nose or a lip which has been lost or excised because of disease. In some cases a finger, or the skin of the arm, may be used for this repair, the hand being fastened to the head for a few days before the transplanted part is entirely severed from its original site.

Tracheotomy.—This is the operation of opening into the trachea or windpipe through the neck, in order to insert a tube through which the patient may breathe during closure of the throat from diphtheria, or swallowing a foreign body, or other cause. A modification of this is laryngotomy, in which the opening is made through the larynx, below the vocal cords.

Paracentesis.—Puncture into the pericardial or pleural cavity to draw off fluid thence.

Operations on the Kidney.—These include that of cutting the kidney open to remove a stone, or a new growth, or to drain off fluid (nephrotomy); suturing it to the abdominal wall to prevent floating; incising and stripping off the capsule in cases of Bright's disease (nephropexy); and removal of a kidney (nephrectomy).

Appendectomy.—This is removal of the vermiform appendix, a procedure necessary in many cases while the acute inflammatory process of appendicitis is in progress. In some cases where [illegible]ation has not occurred, an "interval op[illegible]" is done, after the subsidence of the [illegible]ttack and before the incidence of another [illegible]n incision is made a few inches above [illegible]n, in the right side of the abdomen; all [illegible]ns between coils of the intestine are di[illegible]; the appendix is found, and is cut off close to the point of emergence from the cæcum, and its stump is inverted into the intestine and fastened with sutures of catgut. The peritoneal cavity is then washed out, and the abdominal wound is closed around a drainage tube. It is now advised that operation be done very early, and the possibility of fatal peritonitis be averted.

Operations on the Nerves.—These may be necessary to suture divided nerves together, to resect parts of nerves, or to remove ganglia in severe neuralgic affections.

Trephining.—This is opening the skull by means of the trephine, an instrument which removes a button of bone. Resort is had to it in order to explore the brain with needles or canulæ in search of abscess, hæmatoma, or cyst; to elevate depressed portions of a fractured skull, and to pick out fragments of bone; to expose a sinus because of thrombosis or suppuration; or for intracranial hemorrhage. The operation is also performed for the purpose of exposing various arteries and nerves. The "mastoid operation," which is frequently undertaken for middle-ear suppuration, is substantially as follows: An incision is made through the soft parts down to the bone back of the auricle on the affected side, from the tip of the mastoid process to a point opposite the upper limit of the auricle. Bleeding vessels are secured, and the periosteum is separated from the bone as far forward as the meatus. A bony projection which is thus uncovered is cut away with a chisel or gouge, and some of the cortical layer of the bone over the antrum is removed. The mastoid cells are easily reached, softened bone is scraped away, and exudate is removed from the tympanum. In some cases two of the small bones of the ear, the incus and malleus, must be removed. (See EAR.) Proper drainage is arranged through the wound and the meatus, and sutures are put in. Consult Park, 'Surgery by American Authors' (1901); Kocher, 'Text-book of Operative Surgery' (1903).

Oper'culum, in conchology, the horny or limy plate developed upon the "foot" of many gasteropods, serving to close the aperture of the shell when the animal has withdrawn into its abode. The operculum is a cuticular development on the dorsal side of the foot, behind the shell. It is present in nearly all land, freshwater and marine *Prosobranchiata,* is absent in all *Opisthobranchiata* in the adult state, except *Actæon,* and in all *Pulmonata* except *Amphibola,* and has been lost in several familiar families, as the cones, mitres and cowries. As a rule the operculum exactly fits the aperture, and hence it varies in outline in different groups; but in some cases where the aperture is very large it closes it only in part. Other abnormalities exist; and in general the operculum is a variable character of little if any value in classification. The theory formerly held that this excrescence was homologous with a second valve, or with the byssus of bivalves, is not now considered justified by facts. Use has been found for certain round, thick, and concentric opercula, to represent the eyes in rude human figures made by South Sea islanders; and as eyestones,—small lenticular and smooth ones, as of small turban-shells, which may be slipped easily around the ball of the eye beneath the eyelid, and bring out intruding and painful objects caught there.

Operetta. See OPERA.

Operti, ō-păr'tē, **Albert** (JASPER LUDWIG ROCCABIGLIERA), Italian artist: b. Turin, Italy, 17 March 1852. He entered the British navy as midshipman, but resigned in 1868. He then elected the career of a painter; was illustrator, caricaturist and scenic artist in New York, and accompanied Lieutenant R. E. Peary on two Arctic expeditions, during which he acted as New York *Herald* special correspondent (1896–7). From the studies made during his northern voyages he executed his well known 'Rescue of the Greely Party' and 'Farthest North' (for the Army and Navy Departments, Washington); 'The Schwatka Search'; 'Finding De Long in the Lena Delta'; and 'Dr. Kane.' He was selected as artist by the United States government to the World's Columbian Exposition.

Ophelia, ō-fē'lĭ-a, in Shakespeare's play of 'Hamlet,' the daughter of Polonius. Hamlet, with whom she is in love, having unintentionally killed her father in his madness, turns away from Ophelia, whose reason is now overthrown; and in the various phases of her derangement the drama presents its tenderest scenes of pathos. While gathering flowers, Ophelia is drowned.

Ophicleide, ŏf'ĭ-klīd, a brass wind-instrument of music invented about 1790 to supersede the serpent. It generally consists of a wide conical tube bent double with a bell-mouth, and has eleven keys and a cup-shaped mouth-piece. Its compass ranges a little over three octaves (or thirty-eight semitones), namely from the B flat one semitone below the lowest note of the violoncello to C in the treble stave, and it is capable of very accurate intonation. It is used in orchestras, and is capable of very pleasing effects as a solo instrument, but is all but superseded by the saxhorn (q.v.).

Ophid'ia, an order of reptiles containing the serpents,—saurians in which the right and left halves of the lower jaw are connected by an elastic band. (See LIZARDS.) The appendages and shoulder-girdles are typically absent, although in certain families rudiments of the posterior appendages and pelvis still persist. The quadrate is not fixed, and, acting as the suspensor of the lower jaw, gives a surprising capacity for swallowing. The number of vertebræ is great. The skin is covered with horny scutes, which are periodically shed with the cuticle. The eyes are without lids. The sense of smell is acute. The left lung is smaller than the right and may be quite rudimentary. A few snakes are viviparous. The *Ophidia* seem to have arisen from lizard-like ancestors in Tertiary times. They are now nearly cosmopolitan, only the coldest countries and certain large islands (New Zealand, Ireland) being devoid of them. See SERPENTS.

Oph"ioceph'alus, the type-genus of the family *Ophiocephalidæ,* containing the curious East Indian fishes called Serpent-heads.

Oph"ioglossa'les, the grape fern. See FERNS.

Ophir, ō'fẽr, a place mentioned in the Old Testament scriptures from which the ships of Solomon brought large quantities of gold, sandal-wood, and ivory wherewith to adorn the king's house, then building at Jerusalem. There are different opinions about its exact situation. Some scholars place it in northern Asia, others in India, and America has likewise been mentioned as comprising Ophir. Later it has been located in the East Coast of Africa.

The explorer and traveler Baer identifies Ophir with Malacca. Lassen's view that Ophir is the Semitic name for the "Abhira," a pastoral people in Northern India, seems best grounded, and the land of Ophir is the territory they inhabit. This Ophir has no connection with the same word occurring in Genesis x. 29.

Oph'ite, in mineralogy, formerly a synonym for serpentine (q.v.); now a basic rock of greenish color and eruptive origin, with an exterior resemblance to serpentine, occurring especially in the Pyrenees. Its texture is intermediate between granite and porphyry, and its structure is characterized by the incomplete crystallization of its parts, some being completely crystallized and others entirely amorphous, a phenomenon called ophitic structure.

Ophites, ŏf'īts (Gr. *ὄφις,* a serpent), a Gnostic sect of the second century who worshipped a living serpent. They considered that the serpent in Eden by misleading Eve was the liberator of man from the power of Jehovah, whom they regarded with abhorrence. See SERPENT-WORSHIPPERS.

Ophiuchus, of-ĭ-ū'kŭs, in astronomy, an ancient northern constellation, representing a man holding a serpent; called Serpentarius, the Serpent-bearer. It has about 80 stars visible to the naked eye.

Oph"iuroi'dea, a class of the phylum *Echinodermata,* embracing the slender-armed sand-stars. It is divisible into two orders: (1) *Ophiurida,* in which the arms are simple (see BRITTLE-STARS); and (2) *Euryalida,* in which the arms are branched (see BASKET-FISH).

Ophthal'mia, inflammation of the eye; a general term used by the older writers, but at the present day either not employed by oculists, or applied by them only to conjunctivitis (inflammation of the conjunctiva) or to conjunctivitis and inflammation of the eyelids. There are various grades and types of conjunctivitis, all of which have to a greater or less extent the following symptoms in common: photophobia — aversion to or intolerance of light; an increased and usually altered secretion; and injection of the blood-vessels, accompanied sometimes with a slight velvety opacity, or special products, a false membrane, granulations, etc. In all forms of conjunctivitis there is need of cleanliness, antiseptic washes, poultices, protection from excess of light and injuries, dust, etc. In most forms the case should be under the care of a physician.

Simple Conjunctivitis.—This is catarrhal conjunctivitis, characterized by congestion, a feeling as of the presence of a foreign body, lessened transparency of the conjuctiva of the lids, and a discharge, at first watery, then acrid, excoriating the cheeks, may become mucous or mucopurulent, gluing the eyelids together. Usually the vision is clear, but it may be hazy if the secretion is more than watery. Micro-organisms, neglect of treatment, filth, and the scrofulous diathesis may convert a simple conjunctivitis into a purulent and more or less communicable or infectious disease. Usually the prognosis is good, recovery occurring in a few days.

Varieties of Simple Conjunctivitis.—Associated conjunctivitis occurs sometimes with eczema, facial erysipelas, bronchitis, and other disorders; exanthematous conjunctivitis (ophthalmia morbillous, ophthalmia scarlatinous, etc.) may accompany or follow exanthematous diseases such as measles or scarlet fever; mechanical conjunctivitis is caused by wind, tobacco-smoke, dust, or injuries; toxic conjunctivitis by exposure to the influence of certain chemicals, aniline dyes, chrysophanic acid, etc., or by the prolonged use of atropine, eserine, cocaine, etc.; and symptomatic conjunctivitis from the strain of the eyes in defective vision. For treatment, remove the cause, if possible, and alleviate associated conditions. Wash the eye frequently with cold or hot water, as agreeable, but do not rub it. As a wash or spray, ten grains of boric acid to an ounce of water will be of service. When the discharge is mucopurulent, stronger applications are necessary.

Acute Contagious Conjunctivitis.—Known also as acute mucopurulent conjunctivitis, epidemic conjunctival catarrh, and pink-eye, this was formerly classified as a severe form of simple conjunctivitis. It is distinctly contagious, attacks persons of all ages, is believed to be due to specific bacilli, resembles at first simple conjunctivitis, then the discharge is mucopus or purulent, the conjunctiva is much swollen, and even chemotic, and the lids may be œdematous and glued together. Prognosis is good, but relapses are common, recovery taking place usually in about two weeks. Treatment is similar to that of simple conjunctivitis. The affection being contagious, all sources of such contagion as is due to towels, sponges, etc., must be discarded.

Purulent Conjunctivitis.—This acute blennorrhœa of the conjunctiva is of two forms, that of the new-born (ophthalmia neonatorum), and the gonorrhœal conjunctivitis of adults. Conjunctivitis neonatorum, characterized by severe pain, great swelling of the eyelids, serous infiltration of the conjunctiva, and a copious discharge of contagious pus, is caused by the introduction into the eye of infecting material (sometimes gonorrhœal), usually from some portion of the genito-urinary tract of the mother, at the time of or shortly after the child's birth, or from soiled towels, etc. The chief risks are cohesion of the eyelid and eyeball, opacity, ulceration of the cornea, and sometimes perforation. Prognosis is grave, but treatment is generally successful if a competent physician has charge while the cornea is still clear. Cold compresses at first, then hot fomentations, constant gentle removal of the discharge, at first a mild eye-wash, as before indicated, later the introduction of a solution of nitrate of silver (Crede's plan) or other substances, absolute cleanliness, and the destruction of lint, cotton, or any infected substance, comprise the measures of relief.

Gonorrhœal Conjunctivitis.— This affection (purulent ophthalmia, acute blennorrhœa in adults) is usually caused by contagion from an acute gonorrhœa or a gleet, or from a similarly affected eye, through fingers, linen, towels, etc., though it may arise from a vaginal leucorrhœa, diphtheria, and other causes. The symptoms are similar to those which appear in the purulent conjunctivitis of the new-born but more severe, and the treatment should be entirely in the hands of the physician. The vitality of the cornea is in constant danger; ulceration and matting together of the iris and cornea, inflammation of the choroid, iris, etc., and even destruction of the eye may occur. The disease may become chronic and one of the forms of chronic conjunctivitis.

Croupous or Pseudomembranous Conjunctivitis.—Of this, which is plastic membranous conjunctivitis, there are two forms, one quite mild, usually attended by a soft, painless swelling of the lids, a membranous exudation upon the conjunctiva, and generally a scanty seropurulent discharge occurring before the seventh year. The cause is not known. The second form is rapid in development, is attended with much swelling and discharge, and may quickly destroy the cornea. Frequent removal of the discharge with a solution of common salt, cold compresses, and the use of nitrate of silver, etc., are the measures employed for relief. The affection occurs with measles, scarlet fever, influenza, and non-febrile disorders.

Diphtheritic Conjunctivitis.—This form usually occurs in young children, either mildly with pseudomembranous formation, or in a deep-seated character, necrotic, with a very painful board-like exudative swelling of the lids and a scanty seropurulent or bloody discharge. Sloughing of the cornea may occur. Prognosis is grave. Cleanliness, antiseptic washes, and building up the tone of the body are necessary.

Phlyctenular Conjunctivitis.—Also called phlyctenular ophthalmia, scrofulous ophthalmia, eczema of the conjunctiva, characterized by one or more grayish, sometimes purulent elevations, generally on the eyeball portion of the conjunctiva. It occurs in strumous and badly nourished children, and tends to a disease of the cornea (phlyctenular keratitis) and to its opacity. Attention to hygienic measures, good food, etc., tonics, mild eye-washes, followed by the application of an ointment of the yellow oxide of mercury, are requisites of treatment.

Spring Conjunctivitis.—Considered by some writers as a distinct disease, by others as a form of chronic conjunctivitis. This occurs mainly among children in the spring and summer, and is always bilateral. There is stinging pain, considerable mucous secretion, and the formation of gray semi-transparent nodules, which swell and overlap the edge of the cornea. Prognosis favorable except for replapses. Treatment requires protection of the eyes with dark glasses, weak astringent and antiseptic lotions, and perhaps destruction of the granulations and hypertrophic masses.

Follicular Conjunctivitis.—Follicular ophthalmia, characterized by small pinkish prominences mainly in the conjunctiva of the lids, usually in rows. It is the result of bad hygienic surroundings, as in crowded tenements and pauper schools, where it may be epidemic. It is allied to granular lids. The prognosis is good, but the disease is troublesome, and often lasts for months. The treatment consists in general hygienic measures, and certain stimulating and antiseptic applications.

Granular Conjunctivitis.—Granular ophthalmia, Egyptian ophthalmia, military ophthalmia, known as trachoma, and, popularly, as granular lids. It occurs in acute and chronic forms. is infectious and sometimes widespread, and

although affecting mainly persons of poor health and in bad hygienic surroundings, it may attack those in good health. The symptoms of the acute form are: swollen lids; reddened conjunctiva; hypertrophied papillæ, between which are non-vascular, roundish granulations; scalding tears; intense photophobia; pain in the brow and temple; and mucopurulent or purulent discharge. In the chronic form, there is less of pain, redness and other results of inflammation; the conjunctiva is roughened; the granulations degenerate and soften. In both forms there is danger of cloudiness and ulceration of the cornea, and of scars with consequent deformities of the lid and its border. The sufferers should shut out the light and keep the eyes most of the time partly closed. The treatment in earlier stages calls for soothing remedies; in chronic or severe cases, caustics and astringents, operative procedures, and general medication.

So prevalent is trachoma in cities, especially in the crowded tenement districts, that the health authorities now treat affected children at the schools and in their homes, thereby greatly limiting the spread of the disease and checking defects in vision. The work done on these lines in the city of New York since 1902 has been particularly noteworthy. Trachoma, mainly brought here by Russian Jews and other immigrants from unclean environments, and which rapidly spreads by contagion, was making inroads among the more exposed children of the public schools, and threatening not only the health of New York, but, more remotely, that of the country at large. The board of health took vigorous measures for its suppression. Every child in the public schools was subjected to medical examination by experts appointed by the board, and in cases of slight affection parents were notified and instructed in the necessary precautions of cleanliness, etc.; in more advanced cases the children were taken out of school, isolated at home, and there treated; and in extreme cases still more rigorous methods were adopted. At the same time all teachers in the public schools were required to observe and report upon the slightest appearance of the disease, in order that affected children might be promptly excluded. Within two years the most remarkable results were attained; trachoma was almost eradicated from the city, and it has been demonstrated that the disease, under vigilant administration of public health officials, can be brought and kept under control.

Subacute Conjunctivitis.— Sometimes chronic, this appears in association with a diplobacillus, is insidious, runs a course of six weeks to six months, is characterized by redness of the edges of the eyelid, congestion, and hypersecretion of the conjunctiva. Treatment is the same as in simple conjunctivitis, with the addition of zinc-sulphate solution.

Pavinaud's Conjunctivitis.—This form, usually unilateral, is rare. It was first described by Pavinaud and believed to be due to infection of animal origin. The symptoms are swelling of the lids, mucopurulent discharge, large polypoid granulations, with ulceration between them, and lymphatic involvement. It usually lasts from one to several months. Treatment includes antiseptic washes — nitrate of silver or sulphate of copper — and surgical removal of granulations.

Chronic Conjunctivitis.— Chronic ophthalmia: it may be either an independent affection or the result of an acute blenorrhœa. As an independent disorder, it occurs mainly in elderly people. The symptoms are hyperæmia, soreness and thickening of the edge of the tarsal conjunctiva, swelling of the caruncle, and slight mucopurulent discharge. Treatment: antiseptic lotions, astringents, attention to the tear-ducts and refractive errors, and cleanliness. Lacrimal conjunctivitis is a form of the above, depending upon obstruction of the lacrimal passages.

Egyptian and Military Conjunctivitis.— These are terms loosely used for all forms of conjunctivitis occurring in barracks and crowded assemblies, more or less epidemic and chronic, and attended by a mucopurulent or purulent discharge.

Ophthal'moscope, an instrument for observing the structure of the eye. The first of the kind was invented by Helmholtz in 1851, but improved instruments are now generally in use. Most of these consist of a mirror by which a ray of light is directed on the eye of the patient, and a double convex lens, by which the illumined parts of the structure of the eye are enlarged in order that they may be more easily examined. The observer looks through a hole in the centre of the mirror. The examination must take place in a room lighted only by a single lamp, which is placed on a level with the patient's eye on his right or left hand, according as the eye which is to be examined is the right or the left one. The patient's eye is prevented from receiving the direct rays of the lamp by the interposition of a metal plate. The operator having placed the patient in front of him, and with one hand directed the light reflected from the mirror on the eye which he wishes to observe, adjusts the convex lens, which he holds in the other hand until he gets the proper focus. He then looks for the entrance of the optic nerve, which he sees as a white disk, from which proceed the central vein and artery of the retina, giving off six or eight branches. This is the part which it is most necessary to examine, but all the other parts of the internal structure of the eye may be observed in the same way. The patient must change the position of his eye until the observer has the part he wishes to examine within the range of his reflected ray and convex lens. Whatever instrument is used, considerable practice is required in the observation of sound eyes before the operator is able to use it effectively in detecting disease in the eye. See EYE; SIGHT, DEFECTS OF.

Opie, ō'pĭ, **Amelia Alderson,** English novelist: b. Norwich, England, 12 Nov. 1769; d. 2 Dec. 1853. She was married to John Opie, the well-known portrait painter, in 1798, who greatly encouraged her in her literary work. In 1801 she published 'Father and Daughter,' a novel which at once attracted attention, and she steadily gained in popularity by her subsequent work which delineated with pathos and interest the English home-life of the day. She was also a poet of some ability. After the death of her husband in 1807 she returned to her father's home and subsequently joined the Society of Friends. She published: 'Adeline Mowbray' (1804); 'The Warrior's Return and Other Poems' (1808); 'Madeline' (1822);

'Lays for the Dead' (1833); etc. Consult the Life of Mrs. Opie by C. L. Brightwell.

Opie, John, English painter: b. Saint Agnes, Truro, Cornwall, May 1761; d. 9 April 1807. When about 19 he was taken to London by Dr. Wolcott ("PETER PINDAR"), who befriended him in various ways. Through the influence of his patron he acquired great fame as a portrait painter, became known as the "Cornish Wonder," and while this season of favor lasted, realized a moderate fortune. He then turned to historical painting, and produced his 'Murder of James I. of Scotland'; 'Slaughter of Rizzio'; 'Jephtha's Vow'; etc. His 'Slaughter of Rizzio' was exhibited in 1787, and secured his election to the rank of associate to the Royal Academy. In 1788 he was appointed a Royal Academician. In 1805 he was elected professor of painting in the Royal Academy, but only delivered four lectures before his death, and these with a memoir by his wife were published in 1809. He is also the author of the biography of Sir Joshua Reynolds in Wolcott's edition of Pilkington's 'Dictionary of Painters' and of 'An Inquiry into the Requisite Cultivation of the Arts in England,' which among other influences led to the formation of the National gallery.

Opisthoglyph'a, one of the two groups, the other being *Proteroglypha,* into which venomous serpents (q.v.) are divided according to the anterior or posterior position respectively of the poison-conducting teeth. The snakes of the first group are included in the family *Colubridæ,* and are represented by the neotropical tree-snakes (*Dipsas*), the European cat-snake, and the Oriental *Homalopsinæ.* In their case one or a few of the posterior maxillary teeth have a groove or furrow in front, which conducts the secretion of the enlarged upper labial glands into the wound. These opisthoglyphs comprise about 300 species and are of considerable morphological interest, since they connect the *Colubridæ* with the *Viperidæ,* the characteristic (proteroglyph) poisonous apparatus of which seems to have been derived from that of the *Opisthoglypha* by the reduction or shortening of the anterior portion of the maxillaries and the harmless teeth so that the posterior or poison fangs come to the front. The *Proteroglypha,* then, are those serpents, such as the cobras and coral-snakes (*Elapinæ*), sea-snakes (*Hydrophinæ*), vipers and rattlesnakes, whose poison fangs are in the front part of the mouth.

Opitz, ō'pĭts, **Martin,** German poet and critic, the "Father of modern German poetry": b. Bunzlau, Silesia, 23 Dec. 1597. He was educated at Heidelberg, where he became the centre of a circle of young poets, fled to Holland in 1620 to escape the plague, returned to Silesia in 1622, taught for a time, in 1625 was ennobled and crowned with laurel for his poetic fame by the Emperor, from 1628 to 1632 was secretary of Dohna, the persecutor of Silesia, and then became the client of Ulrich of Holstein, as ardent a Protestant as Dohna was a Catholic. But the story of his life, with its changing of sides and its petty flatteries is less important than his literary work. When scarcely 21 he wrote 'Aristarchus, sive de Contemptu Linguæ Teutonicæ,' urging the infusion of classical imitation into German poetry; and in 1624 this German Boileau published 'Das Buch von der deutschen Poeterey,' which insisted on accent in place of mere numbered syllables and in many other respects made possible the revival of German poetry in the 17th century. His poetical work was correct, unoriginal, and various, including manifold versions and imitations; the antiquarian epic 'Zlatna' (1623); the 'Trostgedichte in Widerwärtigkeiten des Krieges' (1633), the best of his metrical attempts; 'Deutsche Poemata,' a book of selections; and a pastoral 'Die Nimfe Hercine' (1630). Consult the German biographies by Strehlke (1856), Palm (1862), and Hoffmann von Fallersleben (1858); and Perry, 'From Opitz to Lessing' (1884).

Opium, the dried milky juice of the unripe capsules of a poppy (*Papaver somniferum*), which for this product has been cultivated through many centuries. Every species of poppy is capable of yielding it to a greater or less extent. Opium is procured by making incisions in the poppy-head or capsule, taking care not to penetrate its cavity; the juice then exudes in drops, and after being allowed to remain for a day upon the edges of the incisions, it is scraped off — a brownish, jelly-like material. As the soft opium accumulates it is molded into roundish lumps or irregular flattened cakes, of various sizes, and put aside to dry. When of proper consistency it is generally wrapped in leaves and sent to market. When fresh the lumps and cakes are plastic, becoming harder on the exterior, are of a chestnut or darker brown, and have a disagreeable, even sickening odor, and a bitter nauseous taste. Sometimes opium of commerce is mixed with pebbles, shot, ashes, clay, sand, and with resinous, saccharine, and mucilaginous substances, and has an excess of moisture. Opium is a complex substance. "It ordinarily contains an odorous principle, glucose, gum pectin, a compound resembling caoutchouc, wax, fat, resin, coloring matter, and plant-tissue," also the neutral principles meconin and meconoiosin, and meconic acid and thebolactic acid, similar to lactic acid. The most important of the derivatives obtained from opium are its alkaloids, 19 in number. In all probability the poppy was originally brought from Asia Minor. It is now grown extensively there, and in Egypt, India, Persia, China, and Japan, less extensively in several parts of Europe, especially France and Germany, and in the United States. As an ornamental flower it is cultivated in nearly all temperate countries.

The principal varieties of the opium of commerce include Turkey opium, used principally in Europe and America; Persian, of variable quality, seldom used in this country; East Indian, rather a poor variety, used at home and exported to China and other Asiatic countries: Chinese, consumed in the East, largely for smoking.

Alkaloids of Opium.— Those at present recognized are morphine, which crystallizes in white needles, and which was discovered in 1816 by Sertürner; narcotine (shining prisms or long needles, tasteless, odorless), discovered in 1803 by Derosme, although its basic nature was first shown by Robiquet in 1817; codeine (nearly colorless octahedra), discovered in 1832 by Robiquet and described by Grimaux in 1881: prepared from morphine by heating it with methyl iodide and soda, it is methylmorphine; narceine or narceia (long quadrangular prisms or white

silky needles, odorless), discovered in 1832 by Pelletier; pseudomorphine (fine crystalline powder, derived from morphine), also called phormine and oxydimorphine, discovered in 1835 by Pelletier and Thibournevy; thebaine or paramorphine (silver scales or prisms with styptic taste), discovered in 1835 by Thibournevy; paparenine (colorless needles or prisms), discovered by Merck in 1848; rhoeadine (white tasteless prisms), discovered in 1865 by O. Hesse; cryptopine (minute prisms), discovered in 1867 by T. and H. Smith; oxynarcotine (isolated from the mother liquor of narceine), discovered in 1876 by Wright and Beckett; gnoscopine (woolly needles, obtained from narceine), discovered in 1878 by T. and H. Smith. In 1870–8 O. Hesse announced the discovery of lanthopine (finely crystallized), meconidine (amorphous, not stable), laudanine (large crystals), codamine (crystalline), deuteropine, laudanosine (crystallizable), and protopine (crystallizable). The discovery of hydrocatarnine (crystallizable) was announced in 1869 by Mathieson and Wright. Apomorphine or apomorphia, derived from morphine or codeia, although a depressant, is a prompt and valuable emetic.

Of the alkaloids of opium, morphine, codeine, and narceine are of most importance. Morphine in its action on the body very nearly represents that of the crude drug. The average dose of opium for an adult is one grain; of morphine, ⅛ to ¼ grain. Codeine acts like morphine, but is weaker, and is less likely to be followed by headache, constipation, and other unpleasant symptoms. It is used principally to allay pain and coughs, "Codeine, paparenine, crytopine, and narceine have a certain soporific action, but the remainder of the alkaloids are almost devoid of it."

Officinal Preparations of Opium.—The principal preparations (including the alkaloids) are the acetate, hydrochlorate, and sulphate of morphia, sulphate of codeia, powdered opium, pills of opium (opium and soap), Dover's powder (opium, ipecac, and sugar of milk), troches of licorice and opium, tincture of opium (laudanum), deodorized tincture (McMunn's elixir), camphorated tincture (paregoric), tincture of ipecac and opium (liquid Dover's powder), vinegar and wine of opium, and opium liniment. The use by the physician of one or other of these preparations is to a certain extent a matter of personal habit. The alkaloids are generally considered to act more promptly than opium itself and its solid and liquid preparations, and to be less constipating. Solutions of opium are more prompt in action than solid preparations and salts of morphine than morphine itself.

Properties and Use of Opium.— Opium is a stimulant narcotic; in small doses, stimulant; in larger, a sedative; and in still larger, a narcotic poison. It is readily absorbed from the stomach, less quickly from the rectum and vagina, and very little from the skin, if it is not abraded. When injected under the skin (subcutaneous, hypodermic, or hypodermatic use), its action, as a rule, is rapid. Opium is used by many nations for its exhilarating and anodyne influences, being either eaten, smoked, or used as a substitute for alcoholic drinks. Medically, it is used to relieve pain, to produce sleep in certain low conditions, to allay nervous irritation, as in coughs, to check excessive secretion, as in diarrhœa, dysentery, and diabetes, and to support the system when sufficient food cannot be retained. The action of opium is not always uniform. With some individuals, due to age, race, temperament, condition of health, personal idiosyncrasies, etc., opium produces effects different from the ordinary results, such as delirium, cramps, vomiting, severe headache, and itching of the skin. Young children, old people, and persons of a nervous temperament are particularly susceptible to the influence of opium; small doses sometimes producing in these coma and even death. On the other hand, severe pain, flooding, etc., sometimes requires three to four times the ordinary dose. Many of the soothing syrups and carminatives contain opium. It is believed by many physicians that morphine should never be given to a child under 10, nor a hypodermic injection to a child under 15. In frogs small doses of opium produce tetanus; in mice, convulsions; they stupefy dogs and rabbits; while it requires large doses to poison ducks, chickens, and pigeons. In small doses, opium usually excites or stimulates, increasing the fulness, force, and frequency of the pulse, the temperature of the skin, the power of the muscles, arousing mental action, and affording bodily and mental calm. In a variable time, usually within an hour after the opiate has been taken, there is a disposition to sleep or repose. On arousing from sleep there is frequently headache, with nausea, tremors, etc., until the body recovers its energy. Most of the secretions are diminished by opium, the peristaltic action of the bowels lessened, pain and muscular contractions or spasms allayed, and nervous irritation relieved, but always with the risk of repetitions of the dose and the formation of the opium habit.

Opium-Poisoning.—This is quite frequent, due to the overuse of the drug to relieve pain or produce sleep, or as an indulgence, it being unfortunately too easy to procure opiates. Poisoning is principally from the salts of morphine, either used alone or in patented compounds. The primary or stimulant effects may be loquacity, restlessness, and hallucinations, although the period of exaltation may be short, if present at all, the symptoms of the second or intermediate period rapidly appearing. These are similar to those of congestion of the brain, weariness, dulness, drowsiness, a sense of weight in the extremities; the face is pale, suffused, or cyanotic; the pupils are slightly contracted; the breath is slow, and may be deep and stertorous; the skin may be dry and warm, or cool and wet; the pulse is generally normal; the patient is unconscious, but may be roused by shaking, by the infliction of pain, or by loud talking; and when aroused, his breathing becomes more rapid. In the third period, that of narcosis or coma, the patient cannot be aroused; the face is pale and cyanotic (bluish, especially the lips); the pupils are insensible to light, usually contracted to the size of a pinhead, sometimes dilated toward the end of life; the pulse is rapid and feeble; breathing is slow and shallow, with increasing intervals and sometimes is stertorous; the skin is bathed at first in warm perspiration, then becomes cold and clammy. Convulsions are rare. Recovery may even now take place, or death occurs from failure of

respiration and arrest of the heart's action. A post-mortem examination may reveal nothing abnormal; or the brain may be congested, the vessels of the cerebro-spinal axis gorged with dark blood, the lungs, heart, liver, and spleen distended with dark fluid blood, and serum may fill the ventricles and be beneath the arachnoid.

Treatment of Opium-Poisoning.— Produce emesis, with copious drafts of warm water, with a tablespoonful of salt or a teaspoonful of mustard well stirred in; by tickling the throat with a feather; or by use of a stomach-pump; apply cold affusions to the head and spine, and flagellation to the palms, soles, and calves, and with a damp towel to the back; keep the patient walking briskly, though he begs for rest; give strong coffee and aromatic pirits of ammonia; frequently use the Faradaic current upon the limbs; and resort to artificial respiration if necessary.

The Opium-Habit.— Indispensable as opium is in certain affections, in the hands of the thoughtless and weak it is too often a curse. It is the most seductive of all the narcotics. "By its soothing and exhilarating influences it gains such a hold on the moral and physical nature that the strongest will is unable to emancipate the victim from its enchantment, and moral degradation results." With children, its frequent use in cough-mixtures, carminatives, etc., interferes with the assimilation of food, enervates the system, and prepares the way for depraved appetites. The opium-habit seems to be a disease of comparatively recent times, dating, as some believe, from the invention of the hypodermic syringe in 1848. Undoubtedly the consumption of opium has increased steadily within the last 50 years. This is due largely to the fact that neuroses have increased, owing partly to a more and more hurried and intense mode of living, and in part to the ease with which opiates are obtained and the attractive forms in which they are presented — granules, triturates, etc. The habit is often induced by the frequent use of opium to relieve pain or produce sleep, or is contracted simply through yielding to sensuous enjoyment, as in opium-smoking. It may also be due to defective will-power, transmitted sometimes in a neurotic taint from opium-taking parents and grandparents.

Victims of the opium-habit frequently become so demoralized as to need care in an asylum. They lie, steal, lose self-respect and ambition, are forgetful, may be subject to delusion, fear, and superstition, and are careless as to clothing and necessary habits, while still thinking highly of themselves. The great nerve-centres tolerate stimulation to a certain point. When the limit is reached, the time varying in different persons, the action of the various organs and tracts is disordered. The victim of opium suffers from imperfect digestion, faulty appetite and assimilation, and consequent malnutrition. The red blood corpuscles diminish, he is pale, has nausea, muscles are flabby, and endurance weakens. The kidneys become affected, the skin is congested, and when the disease is advanced, purpura appears. There is often a malaria-like fever. The functions of the testicles in the man and of the ovaries in the woman are suspended. Primarily there is functional derangement of the brain, then permanent deterioration. He becomes a slave to his depraved appetite. When the time draws near for his allotted dose he is nervous, yawns, may have neuralgia, is weak, breaks out into a perspiration, and is miserable. He takes his dose, and is himself again; but after a time the dose has to be increased, and if relief from his craving is not obtained he sinks lower and lower and dies a wretched death. Two methods of cure are employed; one is the gradual reduction of opiates, the other is their sudden withdrawal — in either case giving in their stead bitter tonics, stimulant carminatives, such as ginger, and certain stimulants and medicines. The law holds opium habitués, as it does drunkards, responsible for crimes which they commit. Consult: 'United States Dispensatory and Reference Handbook of the Medical Sciences'; Potter, 'Handbook of Materia Medica, Pharmacy, and Therapeutics' (1901).

Opium, Wild, an American wild lettuce (*Lactuca canadensis*), noted for its tallness, reaching a height in some plants of ten feet.

Opium Traffic, The. The habitual use of opium as a narcotic drug is common in most countries, and particularly so in China, India, Turkey, the Philippines and the Malay Archipelago. The great source whence China has always derived its opium has been India, where, since 1793, the drug has been a government monopoly, the cultivators, in Behar, Benares, and Malwa being paid at a fixed rate for their crops for exportation to China. The trade was contraband, the Chinese government having in 1796 prohibited the importation of opium. Through the connivance of the Chinese local officials, the importation about trebled in the 20 years between 1816 and 1836. In March 1839 the Chinese authorities forbade all foreigners to quit Canton, and ordered them to deliver up the opium in their possession, which was destroyed. War with Great Britain resulted, which ended in the defeat of the Chinese, who were obliged to pay indemnity for the opium. They have since been compelled to admit it, and the Indian revenue derivable from its growth has risen to about $45,000,000 annually. The imports of opium into Great Britain average 600,000 to 700,000 pounds annually. This is chiefly re-exported — about 140,000 pounds to the United States, and over 200,000 pounds to South America and the West Indies. The United States imports nearly 600,000 pounds of crude opium, and from 45,000 to 75,000 pounds of opium prepared for smoking.

Opium in Asiatic countries is chiefly smoked and not eaten, a special pipe and lamp being employed. Before it is suited for smoking it goes through several processes, which bring it into the form of a blackish paste. The pipe, or rather the stem of the pipe, is made of heavy wood, and is about the length and size of an ordinary flute; the bowl is generally made of earthenware. The smoker, who is reclining, takes a small portion of opium about the size of a pea on the end of a spoon-headed needle, heats it at the lamp, and then places it in the bowl of the pipe, the pellet of opium having previously been perforated with the needle. He then brings the opium to the flame of the lamp, inhales the smoke in several inspirations, and is then ready to repeat the process with a fresh quantity of opium. The smoke is exhaled through the nostrils. Old smokers are able to

fill the lungs with it. The smell of the burning opium is rather sickening to those unaccustomed to it.

In China probably about 1 per cent of the entire population smoke opium, but the habit is growing rapidly. Fines, penalties, and even death have been found ineffective to stop the practice. The Japanese government has always steadfastly opposed opium. In Formosa, since that island has become Japanese territory, the Japanese have restricted, and hope eventually to abolish, opium smoking. By a local law of the church, all Roman Catholics in China are forbidden to engage in the cultivation, sale, or smoking of opium. It is universally recognized as a great evil throughout China, the stress being most severe upon the laboring classes, who spend on the drug a large portion of their earnings, and so bring ruin on themselves and their families, too little income being left for food or clothing. Among the richer classes the habit diminishes energy and lowers the moral tone.

The habitual consumption of opium other than smoking, is known as opium-eating, the opium habit, morphine habit, or morphinism. Opium, laudanum, chlorodyne, black drop, nepenthe, morphine, and other forms are all used. They are most commonly taken by the mouth and by the subcutaneous injection of morphine. The habit is usually begun to relieve pain or sleeplessness, and one month's constant use of the drug is said to be sufficient in many cases to confirm the habit. The amount consumed by different individuals varies greatly. Of morphine most habitués take about three grains daily, some five or six grains, while a few go much higher. De Quincey says that at one time of his life he consumed 8,000 drops of laudanum daily, but his ration was very excessive.

In the Philippines the opium traffic, which is a deep-rooted evil, is a question of prohibition versus some form of license. A measure proposed by the United States government for the regulation of the traffic was suppressed in consequence of a vigorous outcry raised in the States against the legalization of the traffic in the drug, and against any form of governmental participation in the profits realized from its sale. Under the law of Spain in force in the Philippine Islands for years before the American occupancy, the Filipinos were forbidden to smoke or use opium, and all dealers in opium were forbidden to sell the drug to the Filipinos or to permit it to be used on their premises by Filipinos. The Spanish system provided for the sale of the privilege of selling opium to Chinamen in each province to an opium farmer or contractor. It provided that opium should only be used or smoked in certain places, which were under the surveillance of the police, and if a Filipino was found in such resorts he was arrested and the owner of the resort was subjected to punishment. This was the system at the time of the American occupation. The Spaniards recognized the habitual use of the drug by Chinamen and the futility of attempting its prohibition, surrounded it with laws which kept it under governmental control, and virtually prevented its use by Filipinos, who showed no disposition to acquire the habit. These laws were not continued by the American authorities, and for nearly five years the only checks upon the sale and use of the drug was a duty imposed in the custom-house and a provision in the municipal code requiring municipal councils to pass ordinances punishing the keepers of dives in their respective towns. The result of this system is presented by Gov. Taft in a statement of the yearly imports of opium, as follows:

	Pounds.
1899	120,066
1900	224,115
1901	369,037
1902	137,583
First four months of 1903	90,466

The falling off in 1902 is attributed by some to extensive smuggling, by others to heavy imports made in 1901 in anticipation of an increase in tariff rates.

In the United States there are said to be over 1,000,000 persons who are habitual users of opium. In all the larger cities opium dens are to be found, while in San Francisco and New York, the habit has become an alarming public evil. It is used, too, in pill form, in nearly every prison and penitentiary in America. In one prison among a population of 1,600 convicts, over 1,200 are habitual users of the drug in the form of pills, which are prepared outside of the prison walls and smuggled to the prisoners. In this instance the market price of an opium pill varies from 10 cents to $5, according to the supply of smuggled pills inside the prison walls. The evil has grown rapidly, and apparently no effort has been made to abolish or control the traffic. Upward of 300 persons are engaged in the business of opium smuggling on the Pacific coast and along the Canadian border, and it is estimated that opium to the value of $2,000,000 is annually smuggled into the United States.

Opodel'doc, a medicinal plaster, said to have been invented by Mindererus, and used for external injuries. The name is now applied to a liniment which is much used as an anodyne application in sprains, bruises, and rheumatic pains. It is prepared by dissolving 3 ounces of common soap in a pint of alcohol by the heat of a sand bath, then adding an ounce of camphor, and a fluid dram each of oil of rosemary and oil of origanum. It concretes into a soft, translucent, yellowish white mass, of the consistency of soft ointment; but it becomes liquid when rubbed upon the skin.

Opon, ō'pōn, Philippines, a pueblo of the province of Cebu, situated on the northwestern shore of Mactán Island, three miles across the channel from the town of Cebu. In 1521 Magellan was killed here in a conflict with the natives. Pop. 11,506.

Opop'anax, a gum resin with a peculiar acrid odor, the produce of an umbelliferous plant, *Opopanax chirorium*. This plant is a native of southern Europe and Asia Minor, and the granular gum is brought to market from the Levant. The physicians of ancient times highly esteemed it for its purifying and aperient virtues, and it still continues a famous medicine in the East, where it is looked upon as a cure for all diseases.

The perfume known as opopanax is not derived from this gum-resin. There is a commercial opopanax, a kind of perfumed myrrh, obtained from a Balsamodendron, largely imported into Germany, where an essential oil is distilled from it.

Oporto, ō-pōr'tō (Port. oo-poor'too), Portugal, a large city and seaport, capital of the

province of the same name, on a steep declivity on the right bank of the Douro, about 2 miles from its mouth, and 170 miles north of Lisbon. The river is crossed by a bold and striking railway bridge, and a high and low level bridge for tramways and foot passengers. The houses rise one above another in terraces, and there are well-built quarters with broad and straight streets, public gardens, promenades, and other attractive features. The chief buildings comprise the Gothic cathedral, and some interesting churches; the bishop's palace, the exchange, the town-house, the custom-house, the English club, the great hospital, the opera-house, theatre, crystal palace, etc. One of the most striking architectural objects is the Torre dos Clerigos (Tower of the Clergy), attached to the church of same name. The principal trade of Oporto is in wine, white and red, but chiefly the latter, much of which is sent to Great Britain, and derives its name *port* from this city. There are manufactories of excellent cottons, silks, woolen and linen stuffs, pottery, lace, buttons, gold and silver wire, glass, leather, etc. Royal tobacco and soap works, iron-foundries and sugar-refineries are also in operation. In ancient times the site of Oporto was occupied by the harbor town Portus Cale afterward Porto Cale, from which the name of the kingdom, Portugal, is derived. Oporto was capital of Portugal till 1174, when the seat of government was transferred to Lisbon. It was taken and sacked by the French in 1805, who retained possession of it till 1809, when the British crossed the Douro and compelled them to retire. Having sided with Dom Pedro, it was besieged in 1831–2 above a year by the troops of Dom Miguel, when much of it was destroyed, and its trade was for the time annihilated. Pop. (1900) 172,421.

Opos'sum, the name, adopted from the Indian name of the northern species, for the family of American marsupial mammals *Didelphyidæ,* more particularly for the typical genus *Didelphys,* and specifically for *D. virginiana* of the United States. The place of this family in the order is among the higher polyprotodonts associated with the dasyures and bandicoots (*Perameles*); and their greatest peculiarity lies in the fact that, with a single exception, this group contains all the marsupials existing outside of Australasia; while the family itself is not represented there, for various marsupials carelessly called «opossums» in Australia are not members of this family, which is confined to America, and mainly to its tropical parts, where doubtless it is a survivor from the Mesozoic Age when marsupials were generally distributed over the whole world. The opossums are arboreal omnivorous animals, ranging in size from that of a cat to that of a mouse. They have 50 teeth, having 10 incisors in the upper jaw, and eight in the lower, one canine tooth on each side in each jaw, three compressed premolars, and four sharply-tuberculated molars on each side. The head is long, muzzle pointed, ears large and naked. The fur is long, loose and grizzled. The tail is long, prehensile, and in part scaly. The feet are plantigrade, with five toes on each foot, their claws long and sharp; but the inner toe of the right foot converted into a thumb, destitute of a claw, and opposable to the other digits. The pouch, so characteristic of marsupials, is absent in the familiar northern and most other species, the nipples opening between folds of skin which represent a marsupium. To these the minute young are attached by the mother as soon as born, which is after only about 26 days of embryonic life, and when still in a very undeveloped condition; and there they cling five or six weeks until able to run about. The young are numerous and remain with the mother until well grown, clinging to her fur and being carried about as she scrambles among the branches, with their tails tightly wound about hers, or about her limbs or neck. Their prehensile rope-like tails are of vast service to these animals, enabling them to use all four feet in food-gathering while suspended by this useful fifth member.

In habits the opossums generally are nocturnal. The food consists chiefly of insects, small mammals, and birds; most species are fond of fruits; and the Brazilian crab-eating opossum (*D. cancrivora*) obtains its name from its partiality for the flesh of crabs, which the northern species will also eat, as well as frogs, when other food is scarce. They are preeminently arboreal animals, and make their homes in hollows of trees, bedded with leaves and soft grass; here the days are spent in drowsy hiding, and the young are brought forth in early summer. Owls frequently share these hollows with the opossums. On the ground the movements of the opossums are slow and awkward. They get credit for being exceedingly cunning animals, and are famous for their skill, and patient endurance of indignities and even torture, in counterfeiting death when threatened with harm. «Playing 'possum» has passed into a proverbial expression to indicate any deceitful procedure. Some observers declare that this supposed counterfeit of death is solely the paralyzing effect of fear, but this simple explanation is not generally regarded as wholly adequate to account for the phenomenon.

The number of species in this family is undetermined, but more than 20 have been named, mainly small animals of South America. The most remarkable form, perhaps, is the tiny reddish "mouse-oppossum" (*D. murina*) of Mexico and southward, which is no larger than a field-mouse. Other species are shrew-like. Of a different genus is the curious yapok (*Cheironectes variegatus*), found from Guatemala to Paraguay, which has the hind-feet webbed. It swims and dives with great ease, gathering from the water its food, consisting of fishes and crustaceans. It inhabits holes in the banks of rivers, and is strongly marked with brown bands on a gray ground. Several of the tropical species are more strongly colored than the northern opossum, which is simply whitish gray.

The flesh of all the larger species is eaten, and that of the Virginia opossum is regarded as one of the woodland delicacies of the Southern States. Hunting the opossum with dogs at night is a favorite sport in the South, especially in autumn, when the body has a thick layer of fat all over. The animal takes refuge in a tree, and is either shaken down or shot as it hangs by the tail. The flesh is usually baked and eaten with roasted sweet potatoes.

Consult writers upon American mammals, as Audubon and Bachman, Goodman, Allen, Merriam, C. C. Abbott, D. L. Sharp, etc. For the family generally consult: Beddard, 'Mammalia' (1902); Alston, 'Biologia Centrali

Americana' (1874); Goeldi, 'Proceedings' of the Zoological Society of London, 1894, p. 457.

Opossum-mouse, one of the diminutive, active, very mouse-like phalangers of the genus *Acrobates.*

Opossum-rat, a book-name, translated from the local name "*raton runcho,*" in Ecuador, of a rare little marsupial inhabiting the northern Andean region, which is of special interest because it represents in America an entirely different branch (the diprotodont) of marsupials from the marsupials, and is the sole survivor of an extinct family (*Epanorthidæ*) formerly prevalent in Patagonia. It looks like an opossum of the size of a rat, lives in high brush-wood, feeds mainly on birds and their eggs, and specimens are obtained rarely and with difficulty. It was first described in the 'Proceedings' of the Zoological Society of London for 1860, by R. F. Tomes, in working out a collection of small mammals obtained by Louis Fraser in Ecuador, published the first notice of *Cœnolestes,* which he described under the name *Hyracodon fuliginosus.* Oldfield Thomas, F. Z. G., rediscovered Tomes' genus in a specimen obtained near Bogotá. This specimen Thomas found it necessary to consider as representing a new species. The name Hyracodon having been found to be preoccupied, Thomas suggested Cœnolestes, calling his specimen *obscurus* and Tomes' *fuliginosus.* Consult Thomas, 'Proceedings' Zoological Society of London for 1895, p. 870.

Opossum-shrimp, a small, shrimp-like marine crustacean of the order *Schizopoda,* so called because of the egg-carrying pouches between the thoracic legs of the female. See CRUSTACEA.

Oppenheim, ŏp'ĕn-hīm, **E. Phillips,** English novelist. He was educated at Leicester, England, and among his published works, several of which have had many readers in this country, are: 'Enoch Strone'; 'A Man and his Kingdom'; 'A Millionaire of Yesterday'; 'The Survivor'; 'The World's Great Snare.'

Oppenheim, Nathan, American physician: b. Albany, N. Y., 17 Oct. 1863. A graduate of Harvard (1888), and of the College of Physicians and Surgeons (1891), he has made a specialty of the diseases of children. He has published in that field: 'The Development of the Child' (1899); 'The Medical Diseases of Childhood' (1900); 'The Care of the Child in Health' (1901); 'Mental Growth and Conditions of Children' (1902).

Op'per, Frederick Burr, American illustrator: b. Madison, Ohio, 2 Jan. 1857. He left school at 14, worked in a newspaper office and then in a store in New York, soon succeeding in getting his humorous sketches published. He was employed upon the Frank Leslie publications three years, and was associated with Puck 1880–99. In the last named year he joined the staff of the New York *Journal.* He has published several of his series of humorous drawings in book form.

Oppert, ŏp'pĕrt (Fr. ō-pār), **Jules,** French Orientalist: b. Hamburg, Germany, 9 July 1825. He was of Jewish descent, and was educated for the law at Heidelberg, but abandoned that calling to study Oriental languages at Bonn and Berlin. His first literary work, 'Das Lautsystem des Altpersischen,' was published in 1847, and in 1848 he accepted a professorship at the Lyceum of Lavel. In 1857 he was professor of Sanskrit at the schools of the National Library, and in 1874 took the chair of Assyriology in the Collège de France, receiving election to the Académic des Inscriptions in 1881. He published: 'Les Inscriptions des Achéménides' (1852); 'Grande Inscription du Palais de Khorsabad' (1863); 'Le Peuple et la Langue des Mèdes' (1879); 'Etudes sumériennes) (1881); 'Le Calendrier perse' (1899); etc.

Oppian, ŏp'ĭ-an, Greek poet: b. (at Korylus or Anazarbus in Cilicia) in the 2d century A.D. He wrote a didactic poem of five books on Fishing (*Halieutica*) in lively but often tumid diction, and with correct and polished versification. Another poem on Hunting (*Cynegetica*) has been falsely attributed to him; but the diction is rough and the verse halting, and the work is no doubt the production of a writer of the time of Caracalla, 3d century A.D. Consult: Miller, 'Oppians des Jüngern Gedicht von der Jagd' (1885).

Opposi'tion, (1) in politics, the party who, under a constitutional government, are opposed to the existing administration, and who would probably come into power on its displacement. A fair and temperate opposition is a wholesome check upon the party in power, as it is for its interest to demonstrate the injustice, impracticability, or insufficiency of the laws or proceedings of the government; but, on the other hand, the despatch of public business may be seriously delayed by the conduct of a factious or obstructive opposition. (2) In astronomy, the situation of two heavenly bodies when they are diametrically opposed to each other, or when their longitudes differ by 180°. Thus there is always an opposition of sun and moon at every full moon; also the moon, or a planet, is said to be in opposition to the sun when it passes the meridian at midnight. Signified by the symbol of the opposition of Jupiter to the sun. (3) In logic, opposition of judgments is the relation between any two which have the same matter, but a different form, the same subject and predicate, but a different quantity, quality or relation. There are five kinds of opposition, namely, contradictory, contrary, inconsistent, subaltern, and subcontrary.

Ops, Roman female divinity of plenty and fertility. She was supposed to make her abode on the earth as the protectress of agriculture, and was worshipped usually in the temple of Saturn, whose wife she was believed to be. Newly born children were especially recommended to her care, and her festivals were called Opalia and Opiconsivia.

Op'tic, Oliver. See ADAMS, WILLIAM TAYLOR.

Optic Axis. See LIGHT.

Optic Nerve. See EYE.

Optical Illusion. See ILLUSION.

Optical Images. See LIGHT.

Optical Phenomena of the Atmosphere. See LIGHT.

Optics. See LIGHT.

Op'timism (Lat. *optimus*, best), the opinion that this world, physically, socially, and morally, is the best that could possibly exist. It is opposed to pessimism (Lat. *pessimus*, worst), the opinion that this is the worst possible world. The optimist looks upon existence as a great and unmixed good. Some advocates of optimism have maintained that while the Author of all things was not compelled to produce the best and happiest order of things, he has in fact actually done so, because the presence of evil teaches mankind to discern and choose the good, by striving through suffering and self-exertion to attain the blessedness which is within the reach of all alike. Other optimists reason *a priori* that it is impossible that God could produce anything that was not the best; that in spite of evil and suffering, it harmonizes with the idea of His perfect goodness to infer that the motive for the creation of man is stronger than that for non-creation, in that life affords means of enjoyment which are unquestionable and give the opportunity and capability of attaining perfection.

The controversy between optimism and pessimism is as old as the beginning of philosophy. In the East it engaged the followers of Zoroaster, the Gnostics, and the Manichæan speculators. The disciples of Thales and his school, of Parmenides and the Eleatics discussed the question; Democritus was an optimist, Heraclitus a pessimist; the Stoic, the Peripatetic, and the Platonist joined in the controversy.

There was a great deal of optimism in Aristotle, and Socrates was a pronounced optimist. The discussion as to the preponderance of good or evil in the world and their admixture was maintained by the fathers of the Church and by the schoolmen. In modern philosophy optimism was advocated by Descartes, Malebranche, and Spinoza, but the full development of the theory was left to Leibnitz (q.v.), who in his 'Theodicée' elaborately expounds the thesis that the present world is the best possible creation, and the most perfect that omnipotence would produce. In recent times optimistic theory has been associated almost entirely with the ideas of improvement and progress (q.v.). See PESSIMISM; SCHOPENHAUER.

Opun'tia. See PRICKLY PEAR.

Oquas'sa, or **Quasky, Trout.** See TROUT.

Or'ach, or **Orache,** a weed. See GOOSEFOOT.

Or'acles, responses believed to be given by a deity to a worshipper or inquirer. We read of ancient Egyptian oracular shrines or oracles, but by far the most celebrated were those of Greece. The oracle at Dodona, in Epirus, the oldest in Greece, appears to have originally belonged to the Pelasgians. Everything points to a native origin, but at a later period Egyptian influence produced important changes, notably the substitution of priestesses for the earlier male interpreters known as Selli. At this oracle Zeus himself was supposed to speak to men through the rustling of the leaves of a lofty oak, but other forms of divination were introduced from time to time, such as the striking of metal basins; and from Plato we learn that in his time the priestesses, following the example of those at Delphi, made their pronouncements in a state of religious frenzy. Dorimachus, an Ætolian general, razed the temple of Zeus here to the ground in 219 B.C., and the oracle appears never to have recovered from the blow. Not so old, but far more important, was the oracle of Apollo at Delphi, in Phocis, where the oracular declarations were made during a period of frenzy by the Pythian priestess seated on a tripod over a chasm from which a peculiar exhalation was supposed to issue. This was the chief national oracle of the whole Hellenic race, and its influence on Greek history must have been considerable. It was sometimes consulted also by foreigners, and attained the zenith of its power in the 6th century B.C. From the time of Alexander the Great its influence was of little account. Other noteworthy oracles of Apollo were those at Abæ in Phocis, at Thebes in Bœotia, at Hysiæ in Bœotia, at Claros in Miletus, at Gryneia in the Æolian territory of Asia Minor, at Argos, and at Delos. Oracles of other gods, such as Dionysus, Hermes, and Pan, are mentioned, and there were also oracles of heroes such as Asclepius, Heracles, Trophonius (a famous one at Lebadea, in Bœotia), Tiresias, Amphiarus, Mopsus, and Colchos. The spirits of the dead were supposed to utter oracular sayings in certain places, especially near Lake Aornos among the Thresprotians and at Tænarus in the south of Laconia. In Italy the only oracles in the strict sense of the term were the temples of Fortune at Præneste and Antium. The oracles were consulted at the outset of every great undertaking, such as the founding of a city or colony, the declaring of war, or the conclusion of peace; but their responses were generally expressed in more or less ambiguous language. Consult: Bouché-Leclercq, 'Histoire de la Divination dans L'Antiquité' (1879–82); Schneider, 'Die Divinationen der Alten mit besonderer Rücksicht auf die Augurien der Römer' (1862); König, 'Das Orakelwesen im Alterthum' (1877).

Oran, ō-rän' (Fr. ō-rŏñ), Algeria, (1) a town, capital of the department and on a bay of the same name in the Mediterranean, 209 miles by rail southwest of Algiers. It rises in the form of an amphitheatre, on the side of Mount Murdjadjo, has quite the appearance of a French town, and is mostly modern. It is strongly fortified by works of recent construction. Among the buildings may be mentioned the cathedral, the grand mosque, the citadel or castle, the Kasbah or old citadel, and the large military hospital. There are two harbors, an old or inner, 10 acres in area, and a new or outer of 60 acres area. The principal articles of export are esparto grass, cereals, wine, olives, tobacco, hides, and skins, etc. Considerable quantities of cigarettes are made and exported. Pop. (1901) 88,235, of whom three fourths are Europeans, about 25,000 being French and 34,000 Spanish. The town was built by the Moors. It was captured by the Spaniards in 1509, by the Turks in 1708, and again by the Spaniards in 1732. It was destroyed by an earthquake in 1791, and shortly after abandoned by the Spaniards. In 1831 it came into the possession of the French, and has

ORANG-UTAN (*Simia satyrus*).

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been developed by them into a large and prosperous town. (2) The department, forming a long belt along the Mediterranean, bounded on the east by the province of Algiers, south by the Sahara, and west by Morocco, has an area of 44,616 square miles, and a population (1901) of 1,103,108.

Orang'-utan, the Malay name, signifying "man of the woods," of the large anthropoid ape (q.v.) of Borneo and Sumatra. The orang belongs to the typical genus *Simia* of the family *Simiidæ,* and there is probably but one species (*S. satyrus*), though some naturalists believe otherwise. The face and skull of the young are very human, but in the adult the jaws become protruding and the crown elevated. The body is short and massive, the legs short and bowed, and the arms and hands disproportionately long, reaching to the ankle, but the thumb is very short. Except the face, hands, and feet, the body is thickly clothed with coarse, reddish-brown hair, which is especially long on the arms, where it converges to the elbow, the thighs, and the beard of the male. There are no ischial callosities, and no tail. Cheek-pouches are absent, but old males have the face much broadened by the development of prominent fibrous warty protuberances, and in this sex the canine teeth become much enlarged. In some respects this ape approaches man more closely than any other existing species, but in others it differs widely and resembles the lower apes. In size it is much inferior to the gorilla of equatorial Africa, seldom exceeding four feet in height, and it lacks the high sagittal crest, and particularly the prominent superciliary ridges, which give to the males of that species so ferocious an aspect. At the present time the orang is confined to the deep swampy forests of Borneo and Sumatra. It is arboreal in habit, and builds nests of boughs and leaves among the branches of the trees. For this mode of life its structure is eminently adapted, its long arms, crooked legs, and great strength enabling it to travel through the tree-tops with the greatest facility. To an equal degree these structures ill adapt it to terrestrial locomotion. It does not stand erect, as often represented, except now and then for a short time, and when supported, but in a semi-erect attitude, resting on the side of the inturned feet and on the knuckles of the hands, which, as a consequence, develop callosities. The orang lives exclusively upon a vegetable diet, consisting chiefly of fruits. The males especially have powerful voices, made possible by the great development of the larynx. Naturally they are sluggish and sullen, but the disposition is mild. Stories of their great ferocity, and particularly of their habit of lying concealed in the branches of trees above pathways, from which they reach down a foot to grasp men by the throat, are pure fables. In confinement one of their most interesting characteristics is their teachability and the changing expression of the face resulting from the great mobility of the lips. Consult: Hartmann, 'Anthropoid Apes' (1886), in which many other authorities are given; Forbes, 'Allen's Natural History,' Vol. I. (1897); and the books of Wallace, Forbes, Hornaday, and other scientific travelers in the Malayan region.

Orange, ôr'ënj, **Prince of.** See WILLIAM THE SILENT, PRINCE OF ORANGE; WILLIAM III., KING OF ENGLAND; MAURICE OF NASSAU.

Orange, Mass., town, Franklin County, on Miller's River and on the Fitchburg railroad; 37 miles north-northeast of Springfield. The town includes the villages of Orange, North Orange, and Tully. The town was incorporated in 1810. The surface is very uneven, the village of Orange being built on a hill that rises abruptly from the river. Orange is one of the most enterprising manufacturing towns of the county; the manufactures include sewing machines, motor-carriages, water wheels, and other machinery, furniture, boxes, shoes, and vests. It has three handsome parks and a public library. Pop. of town (1890) 4,568; (1900) 5,520.

Orange, N. J., city in Essex County, on the Delaware & L. and the Erie R.R.'s; about four miles west by north of Newark. It has electric railroad connections with Newark, Jersey City, East Orange, South Orange, Bloomfield, Montclair, and other cities and towns in the vicinity. Orange was settled about 1666 by a colony from Connecticut. At first it was a part of Newark and was called "Newark Mountain." The residents of "Newark Mountain," in 1718, established a separate church, and the organization was known as "The Mountain Society." This same church was known in 1781 as the "Second Church of Newark," and now (1904) as the "First Presbyterian Church of Orange." In 1790 a further separation took place, and the place was called Orange Dale. In 1806 Orange became a separate town, incorporated under the name of Orange. Other divisions were made, and South, West, and East Orange were established in the years 1861, 1862, and 1863, respectively.

Orange is on an elevation, the lower slope of Watchung Mountain, a ridge extending northeast and southwest, rising in some places 650 feet above tidewater. Adjoining the city or in the near vicinity are Hemlock Falls, in South Orange; Llewellyn Park, which contains 750 acres, and many fine residences, West Orange. Eagle Rock, an eastern crest of the mountain, is now within the limits of the Essex County Park System. The city and vicinity have miles and miles of good roads, many shade trees, and long lines of well-kept hedges. Orange and all the "Oranges" are residential sections for New York business men, many of whom have their homes here, while others remain only during the summer months. The city has considerable manufacturing interests. The chief manufacturing establishments are hat factories, for which Orange is noted, printing plants, and the Edison laboratory near Llewellyn Park. The number of employees in the manufactories is about 5,000. The city has an extensive trade in hats and considerable trade in other manufactures and fruit. Some of the prominent buildings are the Metropolitan building, Music Hall, Masonic Temple, Decker building, the "First Presbyterian Church," already mentioned, the original still standing, but several times remodeled, and the church, school, and library buildings. It has a House of the Good Shepherd, an orphanage, and the Orange Memorial Hospital. The educational institutions are pub-

lic and parish schools, the Stickler Memorial library, a city library, the Orange Training School for Nurses, and at South Orange, Seton Hall College, a Roman Catholic institution for boys and men. The Locke College for Boys, and other private schools are in the "Oranges." There are 20 churches representing a number of denominations. The city has a number of organizations whose objects are educational and charitable, as the Mendelssohn Union, a Bureau of Associated Charities, a New England Society, and several literary societies. It has also a number of athletic and social clubs. The three banks have a combined capital of $450,000. The government, administered under a revised charter of 1879, is vested in a mayor and council, who appoint or elect the administrative officials, except the board of education, which is chosen by popular vote. The city owns and operates the waterworks. Pop. (1890) 18,844; (1900) 24,141. Consult: Wickes, 'History of the Oranges from 1666 to 1806' (1892); Whittemore, 'The Founders and Builders of the Oranges' (1896).

Orange, Texas, city, county-seat of Orange County; on the Sabine River, at the head of navigation, and on the Southern Pacific railroad; 85 miles northeast of Galveston. It is the shipping centre for the surrounding region, exporting rice, cotton, oranges, and live stock. It has several large lumber mills, shingle and saw mills, and also cotton gins and a rice mill. The public schools include a high school for the colored race. The city owns and operates the waterworks. Pop. (1900) 3,835.

Orange, Fort, a former fort built in 1623, on the site of the present city of Albany, N. Y. It was erected by the Dutch as a defense work against the Indians.

Orange City, Iowa, town, county-seat of Sioux County; on the Chicago & Northwestern railroad; 40 miles north-northeast of Sioux City. It is in an agricultural and hog-raising district. Its most notable public building is the county court-house. It is the seat of the Northwestern Classical Academy (coeducational), founded in 1882 under the auspices of the Reformed Church. Pop. (1900) 1,457.

Orange Free State. See ORANGE RIVER COLONY.

Orange and Orange Culture, various species of the genus *Citrus* (order *Rutaceæ*), and their fruits. The most important species is *C. aurantium,* which is the parent of most of the commercial varieties. It is a small, branching, long-lived tree or shrub, with oval or elliptical evergreen indistinctly compound leaves, and very fragrant white flowers. The fruits are globular or elliptical, and vary considerable in size. Botanically considered they are berries divided into eight or ten cells, filled with a juicy and more or less acid pulp. The tough, yellow rind is valued, especially in some varieties, for its oil, which is extracted for use in flavoring and in perfumery. The flowers also are employed in decoration and worn as a significant ornament, especially by the bride at her wedding. But it is as a dessert fruit, and for the manufacture of preserves, marmalade, etc., that the orange is of chief importance. For these purposes the tree has been taken from its native home in southeastern Asia to all tropical and sub-tropical climates in the civilized world, and is cultivated extensively in many places not only to supply the local demands, but for the shipment of its fruits to climates beyond its range of cultivation. In the United States the two important commercial regions of orange growing are Florida and southern California. In the former the region of successful cultivation has been restricted by experience of killing frosts to the southern counties, although previous to 1895 the orange-growing region extended over most of the peninsular parts of the State. In many places the trees were growing wild when the State was settled, and it is surmised that these trees were the progeny of specimens introduced by the Spaniards in the early days. A third region is the delta of the Mississippi River. Parts of Texas, Arizona, and New Mexico are promising.

The species mentioned above has developed several well-marked botanical varieties, each of which has more or less horticultural sorts. The most important botanical variety is *sinensis,* which is the immediate parent of the common sweet orange, and the Portugal or Malta orange. In the United States about 70 of the numerous varieties are cultivated. They are characterized by usually round fruits, which are generally sweet or slightly acid, and have a sweet aromatic skin highly valued in cookery for flavoring. Its juice makes a superior wine. To this group belong the famous Bahia or navel varieties, which are extensively cultivated in California, and usually are seedless. The initial trees, originally native to Brazil, were introduced in 1870 by William Saunders of the United States Department of Agriculture at Washington, and distributed by him throughout the orange-growing sections of the country. It is, therefore, often called the Washington navel. Its peculiar formation is due to the development of a secondary axis with more or less cells in the centre of the fruit.

The bitter, sour, or Seville orange (variety *amara*), is so named from its pulp. Few of its horticultural varieties are cultivated in the United States, except as a stock upon which to bud varieties of sweet orange, lemon, and pomelo,—a use for which they seem especially well fitted. The flowers, immature fruits, and young twigs of this variety are extensively employed in the manufacture of an ethereal oil, and the skin of the ripe fruit in making Bigaradia oil. In southern France the flowers are widely used for making perfumery. The Bergamot orange (variety *bergamia*) is a small tree or shrub rarely seen in the United States, but cultivated in Europe for more than 200 years. The rind of the fruit furnishes Bergamot oil. The mandarin or tangerine orange (variety *nobilis*) is a very small tree or a shrub with dense foliage and small fruits most noted for the looseness of the skin which is barely attached to the pulp. Because of easy removal of the pulp it has received its commonest name — kid-glove orange. Its varieties are gaining in popularity in the United States. The Otaheite orange (variety *otaitense*) is considered by some botanists as a variety of the common sweet orange. Others think it may be a hybrid between the lemon and the orange. It is a very popular pot-plant in greenhouses, on account of its

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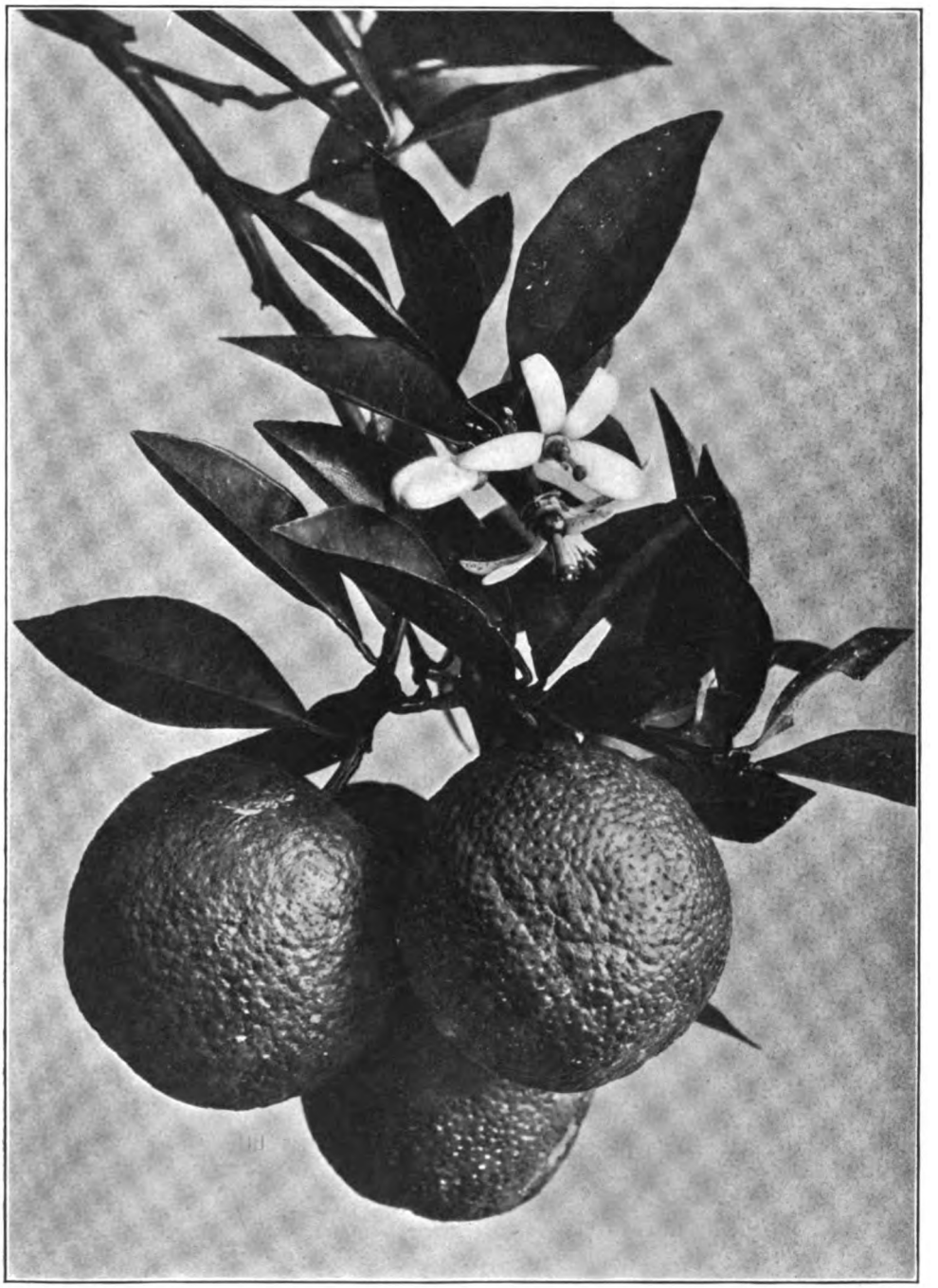

ORANGE, FRUIT, LEAF AND BLOSSOM.

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diminutive size, free blooming and fruiting qualities.

The only other important species of orange is the three-leaved or trifoliate orange (*C. trifoliata*). This is a small, thorny Japanese tree, whose chief use is as a hedge-plant. It is hardy as far north as New York, and is popular southward. Its small, yellow, downy juiceless, bitter, sour fruits are sometimes used in preserves. The plant is also valued as a stock upon which to bud various citrous fruits, especially the kumquat (kin-kin, or kin-kits, *C. japonica*) and the satsuma orange, a variety of mandarin orange. It is said to make the more tender varieties somewhat hardier, and to reduce the size of the larger growing sorts. It seems to be a promising species for hybridizing with other kinds; a large number of hybrid varieties have been produced, but are not cultivated except experimentally. The osage orange (*Toxylon pomiferum*, better known as *Maclura aurantiaca*) is a member of the natural order *Urticaceæ*. It is therefore not properly an orange at all. (See OSAGE ORANGE.)

The orange was formerly propagated almost wholly by means of seeds, but since the sweet orange varieties so produced seemed to be seriously affected with root-disease ("foot-rot") and were variable both in habit of growth and value of fruit, propagation by means of buds has very largely replaced the more primitive methods. The stocks preferred are the Seville and trifoliate orange and the so-called "rough lemon," apparently a natural hybrid, which resembles the lemon in foliage and flower, but whose fruit looks like the sour orange, being large, round, and distinctly acid. These stocks are grown from seed, and when the seedlings are of suitable size they are budded with the desired variety. After growing in the nursery for a year, after being budded, the trees may be set in the orchard. The distances usually chosen vary between 25 and 30 feet, but varieties upon *Trifoliata* stock may be set closer together. When transplanted the tops are rather severely cut back so as to balance the loss of root in digging; and to check evaporation the ground is frequently covered with a mulch of straw, pine needles or other loose material. Clean cultivation is also given from the time the orchard is set, at least during the growing and dry season, followed by the sowing of some cover-crop, which will enrich the soil. This crop may be cut for hay, but its equivalent in such cases should be returned to the land in the form of fertilizer and humus. Fertilizers should be applied liberally because the orange is a gross feeder.

As to soil, the orange thrives upon a great variety of land, profitable orchards being found upon the sandy hammock lands of Florida, the alluvial soils of the Mississippi delta, and the red mineral soils of California. Always, however, these lands must be well drained, in respect to both water and air. Indeed, injuries in California are not infrequently due to the settling of cold air in badly located orange orchards, or orchards from which there is inadequate air-drainage at critical seasons. In Florida and the Mississippi delta frost injuries are due to the influx of immense volumes of frigid air brought by continental cyclones or blizzards. To protect the trees in these regions against frost, various expedients have been tried. In the delta the trees are banked with earth to protect the trunks. In this case the branches may or may not be injured; where they are, the trunks are relied upon to send out new sprouts. These will renew the plantation in a few years. In Florida the groves are often shielded with high board fences on the side of the expected storm; they may also be covered with canvas or slats. Sometimes these enclosures are warmed during severe weather by means of fires, frequently in improvised stoves. At Deland, Fla., more than 30 acres of orange trees are kept under cover.

Orange trees continue to bear, with reasonable care and under favorable conditions, for many years, reaching profitable age in some cases when less than six years old. The trees bear more or less continuously, flowers and fruits in all stages of development being found upon the same tree throughout the year. The great mass of the fruit, however, becomes ripe at one time. When ready for harvest, the individual fruits are cut off with scissors, not pulled from the trees. They are then allowed to stand for a few days to dry and soften somewhat before being graded and boxed for shipment. Each fruit is wrapped in tissue paper before being packed. The standard orange-box contains two cubic feet and usually holds about 200 oranges. Large specimens occasionally reduce the number below 100, and small ones increase it to more than 250. When properly managed both before packing and during shipment the fruits should keep for several months.

Among the difficulties in orange growing are several so-called diseases which also attack other cultivated members of the genus *Citrus*. Perhaps the most widely distributed and troublesome is the "foot-rot," which seems to be worst upon sweet oranges and lemons. It is feared in Australia, Europe, California, and Florida, in the last-named region having caused annual losses of $100,000 or more. Though its origin has not been satisfactorily explained, it is readily recognized by the abundant exudations of gum near the ground, the yellow leaves reduced in size and number, the dry, peeling bark, and the dead twigs. Ultimately the trees become girdled and die. Good drainage, resistant stocks, the avoidance of over-cultivation, and stimulation with nitrogenous manures have been found the most satisfactory preventives. The removal of soil from the base of the trunk has been recommended as a remedy. Blight is another little understood affection. Only bearing trees seem to be troubled by it. The leaves wilt even in moist weather; watersprouts are produced in profusion on the trunk and main branches, but live only one or two seasons; the trees blossom abundantly the season after the wilting, but fruit fails to set and very little reaches maturity. The result is always fatal, even when only a small branch is originally affected. Scab, attributed to a species of fungus (*Cladosporium*), appears as excrescences upon the fruit and foliage. It is considered most troublesome upon lemons, and four or five applications of ammoniacal solution of copper carbonate is recommended as a remedy. (See FUNGICIDES.) "Die-back" is among the most troublesome pests of Florida orange orchards. It seems to be due to imperfect drainage and improper cultivation, which are succeeded by

imperfect nutrition. Hence, improved drainage, cessation of cultivation, withholding nitrogenous manures, and reducing the present content of such foods in the soil by cropping the orchards with nitrogen-consuming crops such as grass, have all been urged as remedies. Mulching is also recommended. The characteristics of this trouble are the dying back of the tips of the twigs, reduction in the "set" of fruit, premature ripening, splitting, and shedding of the fruit. These characteristics may be seen in trees of all ages and varieties. The sooty mold (*Meliola camelliæ*), which also appears upon many other kinds of trees, is not a disease, but because of its presence in abundance may prevent adequate aeration of the leaves. It is a mold that lives upon the honey-dew (q.v.) which is exuded by various species of insects (APHIS, q.v.), which may be held in check by various insecticides, notably resin washes and hydrocyanic acid gas. It often covers the fruit with a felty mass which precludes sale.

Among the numerous insects that feed upon the orange are several caterpillars, the most prominent of which are perhaps the orange dog, the caterpillar of a butterfly (*Papilio cresphontes*), the saddleback caterpillar (*Empretia stimulea*), and the bag-worm (*Oiketicus abbotii*). The cotton-stainer or red-bug (*Dysdercus suturellus*) and the leaf-footed bug (*Leptoglossus phyllopus*) puncture the fruit. The Morellos orange worm, the maggot of a fruit-fly (*Trypeta ludens*), does great damage in Mexican orchards, and its possible introduction is dreaded by American orchardists, because the maggots destroy the fruit by tunneling in it. Several species of leaf-rollers and sucking bugs are troublesome, as are also various species of aphis, notably the orange aphis (*Siphonophera citrifolia*). In Florida and somewhat in Louisiana the white fly (*Aleyrodes citri*) is sometimes so abundant upon the foliage as to impair aeration of the leaves. It is not only a serious pest because of its sap-sucking habits, but because of its exudations of sugary matter upon which the smut fungus mentioned above lives. The rust-mite of the orange, also called the silvery mite of the lemon, because of the appearance of its work upon the two trees, sometimes injures the fruit; and the six-spotted mite (*Tetranychus sexmaculatus*), a close relative of the red spider of greenhouse notoriety, feeds upon the under sides of the leaves. The mites may be controlled by flowers of sulphur, which for the former should be added to kerosene emulsion.

The most dreaded group of insects, however, is that of the scale insects, of which there are a very large number that attack both foliage and trunks. With few exceptions the remedies found most satisfactory for these insects are resin washes and hydrocyanic acid gas. The most notable exception is the white or fluted scale (*Icerya purchasi*), an introduction from Australia. Having become exceedingly troublesome in California, its natural enemy, a lady-bird beetle, was introduced with the result that it is now rarely seen in the State. Other well-known scale-insects in California orange groves are the red scale (*Aspidiotus citricola*), the black scale (*Lecanium oleæ*); in Louisiana groves, the chaff scale (*Parlatoria pergandei*) is most important, but the purple scale (*Mytilapis citricola*) is also somewhat troublesome, as is also the orange chionaspis (*Chionaspis citri*); in Florida groves, the chaff and the purple scale are well-known pests, as also are the long scale (*Mytilapis gloveri*) and the Florida red scale (*Aspidiotus ficus*). Many of the insects mentioned occur in Mexico, the West Indies, etc.; some of them in Europe, Australia and other parts of the world; but the insect fauna of foreign countries is rich in species that do not appear in the American list.

Consult: Risso and Poiteau, 'Histoire naturelle des Oranges' (Paris, 1822); Bonavia, 'The Cultivated Oranges and Lemons of India and Ceylon' (London, 1890); Garey, 'Orange Culture in California' (San Francisco, 1882); Moore, 'Treatise of Orange Culture in Florida, Louisiana, and California' (1883); Harcourt, 'Florida Fruits' (Louisville, Ky., 1886); Wickson, 'California Fruits' (San Francisco, 1891); Manville, 'Practical Orange Culture' (Jacksonville, 1883); Spalding, 'The Orange: Its Culture in California' (Riverside, Cal., 1885); B. Aliño, 'El Naranjo' (Valencia, 1900); various bulletins of the California State Experiment Station, Berkeley, Cal.; and publications of the California State Board of Horticulture, especially the one of 1902.

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Orange Industry, The. From the beginning, the orange has reigned as king in the international fruit trade of the world. The grape has always been and is still, greater in the value of its contribution to commerce and in the distance it safely traverses, but the grape rules not as a fruit, but through its manufactured products, while the orange carries its natural beauty, fragrance and flavor unchanged around the world. From the earliest times the orange has not only been accepted in northern climes as a most expressive exponent of tropical and subtropical salubrity, but by its own distinctive characteristics as a fruit it has won recognition as befitting the highest uses of mankind. By its nature, too, the orange ministers to its own commercial popularity. It endures long shipment; it ripens slowly and through a season of several months which constitute the winter in northern latitudes when local fruits are scant or absent and the refreshment in the citric juices most welcome. The production of such a commercial commodity has from the earliest times constituted an important industry.

It is a significant fact that though the orange thrives in the tropics it does not resent the slight touch of frost which characterizes semi-tropical situations. It is also significant that the fruit grown in semi-tropical countries, especially those which have a more or less distinctly marked two-season climate, differs in character from the strictly tropical orange and is firmer, heavier, more sprightly in flavor and with much better keeping and carrying qualities. The tropical orange has but small commercial importance; the semi-tropical orange rules in the markets of the world. That the semi-tropical orange should have this distinctive character is most fortunate, for it ministers directly to the will for industry which is superior in semi-tropical countries. By the seven degrees of frost which the orange tree will endure without injury, it has gained the 70° of

north latitude, through which its fruit freely seeks a market. Because, though the tropical orange would reach most distant markets in small quantities, it could never attain the commercial supremacy which the fruit now enjoys.

The sweet orange is a native of Eastern Asia and was carried thence to India and to Asia Minor. It possibly reached Portugal from India through the early Portuguese navigators. Thus the distribution of the fruit was westward. The history of modern commercial orange growing consists of a series of progressive movements always trending westward and gaining in volume — the newer centres of production outstripping the older and ultimately largely displacing their product from the greatest markets of the upper divisions of the Temperate zone. When the Moors introduced orange growing into Algeria and Spain they displaced the traffic from Asia Minor and gave the Mediterranean region for several hundred years undisputed possession of the markets of the north of Europe and possession also of the American demand when that arose. When the Spaniards and Portuguese carried the orange to the West Indies and to Florida they laid the foundation for an industry which American enterprise developed in Florida until that district not only contended with the Mediterranean region for American markets, but was planning to invade northern Europe by direct shiploads when the demonstration came that the climate of northern Florida and of the Gulf coast westward was too treacherous for commercial ventures in orange growing — at least with the then popular varieties and methods of propagation. But as the Florida supply failed through the severe freezing of 1895, California came forward and is now not only supplying four fifths of the oranges consumed in the United States, but is selling the highest priced oranges in the London market against a world of competitors. This competition with the product of California is working hardship in the Mediterranean region because this region can more than supply Europe and needs American markets as an outlet. Italy has exported six million dollars worth of oranges and lemons in a year, but recently prices have declined and the interest is depressed. Every effort is being made to secure relief from local taxation and from duties imposed by north European countries. The Spanish product of oranges and lemons, which ranks next to the Italian, has to meet heavy tariffs in all countries except the United Kingdom, and the belief at Valencia is (U. S. Commercial Relations, Vol. 2, 1902, page 686) that the limit of British consumption of Valencia oranges at paying rates has been reached; in fact, the British markets collapsed under the heavy shipments of 1901. When it is stated that the value of oranges imported into the United Kingdom in 1900 was $10,603,950 and such a free buyer has more than enough, it can be realized how important it is to the Mediterranean producers that the populous countries of Central Europe should hold less strictly to agrarian interests which aim to hamper the entrance of food supplies even if they cannot themselves produce them. Manifestly the American product can only enter such markets with a fancy product which will win an extra price, except as a little difference in the ripening season may afford an opportunity. The commercial position of the orange in the United States is also such as to awaken apprehension. The present strength of the situation lies in the protective tariff and the *bête noir* of growers is the possibility of making gaps in it by reciprocity treaties. The product of the West Indies is a direct menace to the Florida product, which meets it in point of market season, and the Mexican product, which is undergoing expansion at the hands of American capitalists, is constantly feared by the California growers because the Mexican railway will give it quick entrance to the great central States and consequent advantage in distribution to the East and the Northwest. The orange from the West Indies and South Florida is different from the California orange in main ripening season and in character of the fruit, but the differences do not give full relief. With the late ripening varieties, the California grower extends his shipments into the autumn and thus laps upon the early fruit from Florida and Jamaica, while the parts of California which bring earliest maturity to the fruit are shipping before the southern fruit is cleared away. In fact, California can keep the markets supplied with oranges fresh from the trees and in prime condition the year around.

As to the difference in oranges grown under humid and arid conditions, the moisture being supplied by rainfall in one case and by irrigation in the other, there has been shown in the arid-region orange a superior density, thinness and texture of rind, higher sugar and higher acid percentages and a more sprightly or vinous flavor. The popular conception of the superior sweetness of the orange grown in humid countries is due not to a greater amount of sugar in the juice, but to less amount of acid. The following are the determinations of sugar and acid of fully ripe Southern California and Florida navel oranges:

	Total sugar per cent	Citric acid per cent
California navel.....	9.99	1.45
Florida navel.....	7.46	0.95

Of course, the quality of an orange is largely inherent in the variety, but all varieties are similarly changed by growth under humid or arid conditions of climate and soil, and this modification becomes a factor of much industrial importance. This fact is strikingly illustrated by the standing of the navel orange in California. This variety has been grown for a century or more as the chief orange in Bahia, Brazil, whence it was taken to California. In Brazil it demonstrated no shipping qualities, and according to Burke (U. S. Special Consular Reports, Vol. 1, page 411) would need to be picked before maturity if to be shipped, while as grown in California and Arizona it is picked at full maturity and is successfully shipped all over the United States and to Europe.

Orange growing in Florida is now (1904) advancing after serious reverses. The product of 1894 was about 6,000,000 boxes. Then came the disastrous freezing in December of 1894 and February 1895, with a temperature of 14° F. at Jacksonville, and in the latter year only 75,000 boxes were shipped. In 1903 the product was about 900,000 boxes. Confidence is being restored by the safety of the trees in the central and southern parts of the State and by the promising results of trial of hardier varieties in

the older citrus district in the northern part. In Louisiana the freezing of 1895 nearly annihilated the citrus fruit interest and there is thus far no disposition to resume production on a commercial scale. In the southwestern corner of Arizona there is a small orange industry which is successfully shipping navel oranges to distant markets. Conditions favor early ripening and an advantage is secured by sale in advance of the main California product. From California the shipments of oranges beyond State lines in 1903 were 21,577 carloads or 7,810,874 boxes. Planting during the last few years has been very active and it is reported by county assessors that in 1902 there were in California 5,372,779 orange trees, of which 1,829,374 were not yet of bearing age. The orange industry of the United States is now largely supplying the home demand for the fruit. Imports of oranges reached their highest value in 1883 at $3,010,662.56 and have since then declined. The value in 1902 was $784,640, of which one half was drawn from the British West Indies; one quarter from Italy; one eighth from Mexico, etc.

The orange industry of the United States is unique in the high social and financial standing of those who have engaged in it and in the striking features of its development. Both in Florida and in California large scale production was first undertaken by northern men who had gained wealth and had lost health in pursuit of it. They brought capital and commercial ability to the ventures which they exploited. The professional classes of the North also participated largely in the work, bringing scholarship, insight and experience in organization. There were a few also who possessed horticultural experience, but the other classes largely predominated. The result has been the development of an industry characteristically American in spirit and new in methods. It has borrowed very little from the practices of Old World orange growers. Free from tradition and prejudice, it proceeded rapidly upon the results of original investigation and experiment, establishing a system of culture and of commercial handling of the product which are without precedent in the older orange regions of the world.

There are several conditions essential to success in orange growing: soil, naturally rich or generously fertilized; temperature, suitable not alone to the life of the tree, but to the soundness and quality of the fruit; moisture, constantly available in adequate quantity, but not in excess; cultivation, to promote root growth by aeration and distribution of moisture; pruning to promote adequate wood growth and leaf action; protection from destructive insects and fungi. All these are indispensable to the commercial success of the enterprise, for though the orange tree is, in everything except the occurrence of low temperatures, hardy and long-lived, there is no profit in orange trees which are subjected to any form of privation or distress. To be profitable it must constantly display the signs of content, namely, deep green and glossy foliage, leaves large (according to variety) and heavy, juicy, golden fruit in profusion. The soils which best befit the tree are deep loams with a good amount of clay, although the tree is not fastidious about soil-texture if plant food and moisture are ample. In Florida the orange soils are predominantly light at the surface and are largely sustained by regular fertilization, but a firm subsoil, for moisture retention within reach of the deeper roots and yet with drainage to obviate standing water renders light soil acceptable. A leachy subsoil, as for instance a deep sand stratum, is undesirable. In California the soils chiefly used for the oranges are clay loams of considerable depth without change in character and which are, therefore, of more enduring richness, but even the best and deepest soils in California are now showing the need of fertilizers to meet the heavy draft of the fruiting tree.

The orange tree is in danger whenever the temperature reaches the freezing point. The degree attained must, however, always be considered in connection with the length of time it prevails: for instance, four degrees of frost for an hour may do less harm than two degrees for two hours. As the temperature falls lower, the duration becomes less important. Five degrees of frost for a very brief interval may injure the ripening fruit and the tenderer leaf growth; ten degrees will ruin the fruit and considerably injure the tree. A temperature of 20° F. or a little less, may kill younger trees to the ground and older trees to the stump, while a temperature of 14° F. in Florida in 1895 killed to the ground the oldest trees, some of which were more than half a century old. The root, however, escapes destruction and will send up new shoots providing the injured top is soon removed. Where the temperature does not fall below 25°, injury has been successfully averted by burning numerous small fires among the trees. In California systematic use of electric alarm bells connected with thermometers to arouse the sleeping workmen and the lighting of small pots of crude petroleum has saved the fruit from injury by six degrees of frost, and such protection has been demonstrated to be profitable in places where such frosts are to be expected. The occurrence of frost is local in California and is not conditioned upon latitude. Oranges are successfully grown in suitable locations between lat. 32° and 40° N.—nearly 500 miles of distance, and the extreme low temperature is practically the same at about the same elevation throughout this distance. It is also true that owing to the intervention of high ranges of mountains giving protection from cold currents of air from the north and northwest, the season is earlier at the north than at the south, and the oranges from northern and central California are marketed in advance of the main crop from Southern California—the fruit being marketed previous to the time of the lowest temperatures (December and January).

In Florida much interest is manifested in experiments now in progress in that State under the auspices of the United States Department of Agriculture, to secure by inter-breeding of the sweet orange and the deciduous orange of Japan, varieties which shall combine the edible qualities of the former with the hardiness of the latter. Oranges are grown with moisture from rainfall in Florida, while in Arizona and California irrigation is essential. Even in parts of California where deciduous trees fruit satisfactorily without it, the orange must be irrigated. The amount of water depends upon the

age of the trees, the depth and retentiveness of the soil, the local rainfall, etc. The average amount is an annual total of fifteen inches depth of water over the whole surface of the land occupied by the trees, and the application is made in fractions at intervals of about three weeks during the dry season. Upon the lighter soils the land is laid off for each irrigation with low levees or dykes into squares enclosing one or several trees, according to the slope of the ground, and these squares are filled from an adjacent ditch. In the heavier soils where the water can be distributed well by lateral seepage, the water is turned into several parallel furrows plowed between the rows of trees and is allowed to run in small streams for 24 hours or more. Cultivation follows irrigation as soon as the ground has dried sufficiently to work well, for the purpose of preventing the surface from baking and preventing also the loss of moisture by evaporation. Thus the surface soil of a California orange orchard is kept constantly clean and mellow. No growth of weeds or other plants is permitted except when crops of legumes for plowing under green, to promote friability and to increase the humus-content of the soil, are undertaken. This cultivation of the surface promotes deeper rooting of the tree and aeration of the lower soil layers and the general thrift of the tree. California experience amply proves that irrigation and fertilization, unaccompanied by thorough and adequately deep cultivation, do not secure the best results.

The orange tree requires only light pruning after its proper shape is attained, but pruning to maintain the shape and to prevent the foliage from becoming too densely matted is essential. Pruning for shape has been more definitely pursued in California than elsewhere. The trees are grown with very short trunks; in fact, the lowest branches almost touch the ground. Cultivation is extended a certain distance beneath the tree by having a lateral extension to the cultivator. The men and teams never pass under the trees. The trees are encouraged to enclose themselves with a solid wall of foliage and all the work upon the tree and gathering of fruit is done with step-ladders in the spaces between the trees. It would be well nigh impossible to climb into the branches of such an orange tree, nor is it ever expected to do so. The trees are generally bluntly-conical or pyramidal in form, though some prefer a more roundish outline. The trees of the varieties most largely grown are low and of a semi-dwarf stature: only a few seedling trees of 30 feet or more in height are now to be seen.

Protection against injurious insects has been undertaken by American orange growers to an extent unthought of in the Old World, and commensurate results have been attained. The most successful method of treating orange insects (and they are chiefly of the class known as scale insects) consists in enclosing the tree with a tight canvas cover or tent and generating beneath it fumes of hydrocyanic acid gas by the action of sulphuric acid upon potassium cyanide. The process requires the best appliances and the most intelligent operation, and detailed accounts are given in the publications of the Agricultural Experiment Station of the University of California, which also prescribe the best remedies for other insects affecting the orange tree. Much has also been accomplished by securing and multiplying parasitic and predaceous insects which have proved wonderfully effective in some cases. The details of propagation and culture of the orange differ according to natural conditions prevailing in the different regions and the local publications cited below convey the information. The same is true of the varieties which constitute the commercial product. The tendency is to concentrate production to a fewer number of approved varieties which are accepted as standards of excellence. In California, for example, the Bahia or Washington navel has constantly advanced in popularity until, by new plantings and by grafting and budding over old trees of other varieties, not less than three fourths of all the oranges grown in California are of that variety.

Current information and publications concerning the development of the orange industry can be obtained from the Bureau of Plant Industry, Department of Agriculture, Washington, D. C., and from the Agricultural Experiment Stations at Berkeley, Cal., and Lake City, Fla. The following books may be consulted: Risso and Poiteau, 'Histoire et Culture des Oranges' (1872); Bonavia, 'Cultivated Oranges and Lemons of India and Ceylon' (1890); Garey, 'Orange Culture in California' (1882); Moore, 'Orange Culture in Florida,' etc. (1886); Manville, 'Practical Orange Culture' (1883); Spaulding, 'The Orange: Its Culture in California' (1885); Harcourt, 'Florida Fruits' (1886); Wickson, 'California Fruits' (1900); Lelong, 'Culture of the Citrus in California' (1900); Hume, 'Citrus Fruits and Their Culture' (1904).

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Orange-melon. See MELONS.

Orange Oil, an essential oil used in manufacturing perfumes and liquors. It is obtained from the rinds of oranges.

Orange, or **Gariep,** gä-rēp', **River,** South Africa, the most important southern river of the continent, rising in the Kathlamba or Drakensberg range, within 100 miles of the Indian Ocean, and traversing the country eastward to the Atlantic Ocean, with a slight northerly inclination. It describes numerous wide curves in its course of 1,300 miles, and separates Cape Colony on the south from the Orange River Colony, Griqualand West, Bechuanaland, and German Southwest Africa on the north. Area of basin, 325,000 square miles. Its principal tributaries are the Caledon and the Vaal, both joining it from the right. Its volume varies greatly between the dry season, when it is not navigable, and the rainy season, when it overflows its banks in the upper parts of its course. Its mouth is obstructed by a bar.

Orange River Colony, South Africa, formerly ORANGE FREE STATE from 1854 until 1900, when it was annexed after joining in the Boer invasion of the neighboring British territory, and now forms a British colony bounded on the north by the Transvaal Colony, east by Natal, southeast, south, and southwest by Basutoland and Cape Colony, and west and northwest by Griqualand West and South Bechuanaland. Area, 48,326 square miles, divided into 19 districts. Capital, Bloemfontein (q.v.) connected

by rail with Cape Town and Port Elizabeth, and also with the Transvaal and Natal. The country generally consists of vast undulating plains, lying about 5,000 feet above sea-level, and interspersed in many places with rocky hills called kopjes. The country is cold in winter, and in summer is liable to violent thunderstorms and long droughts; the climate, however, is generally healthful. The rivers that intersect the country are all small, and the boundary rivers, the Vaal and Orange, are unavailable for traffic. Agriculture and pasturing are the chief occupations, and wool, hides, and ostrich feathers the principal exports. Diamonds and other precious stones have been found in paying quantities, rich coal mines exist, and the State is said to abound in other mineral wealth. Gold was discovered in 1887.

Prior to 1836 this region was inhabited by Bushmen, Bechuanas, and Zulus. The colony was founded in 1835–6 by Dutch settlers from Cape Colony. It was annexed by Great Britain in 1848 in order to put a stop to the Boer outrages on natives; but in 1854 it was recognized as an independent state. The language of the country is a Dutch dialect, and the Dutch Reformed Church is the dominant religion. Under its independent régime the executive was entrusted to a president elected for a period of five years by universal suffrage; while the volksraad or parliament, elected for four years, exercised legislative functions. The history of the Orange Free State till 1899 was one of steady, peaceful progress, interrupted by hardly any stirring event, except some fighting with the Basutos down till 1869, and a more serious quarrel with the British government in 1871 concerning the Kimberley region. The latter dispute was settled by arbitration, under which the British government agreed to pay £90,000 to the Free State as compensation for its loss. In 1889 the state was admitted into the Customs Union of South Africa, and in that year also the railway from the Orange through Bloemfontein to the Vaal was completed. The greatest president of the state was Johannes Hendrikus Brand, afterward knighted as Sir John Henry Brand, who held office from 1863 till 1888. His successor was Francis William Reitz, who was latterly state secretary of the Transvaal republic. The last president of the state was M. T. Steyn, elected in 1896 and re-elected in 1901. In 1897 an alliance with the Transvaal for mutual defense was confirmed. When the war between Great Britain and the Transvaal broke out in October 1899 the Free State Raad decided to stand by its alliance treaty, and joined the Transvaal in the invasion of British territory. After the state had been invaded from the west and Bloemfontein occupied, it was annexed to the British empire under the name of Orange River Colony, by proclamation of date 28 May 1900, but President Steyn and a certain number of his followers still refuse to accept the annexation. (See SOUTH AFRICAN WAR.) Pop. (1890) 77,716 whites, and 129,787 colored; total, 207,503.

Orange-root. See GOLDEN SEAL.

Orange-tip, one of the black and white butterflies of the family *Pieridæ* (q.v.), which are conspicuously marked with an orange spot at the end of the front wings.

Orangeburg, ôr'ĕnj-bĕrg, S. C., city, county-seat of Orangeburg County; on the Edisto River, and on the Atlantic Coast Line and the Southern R.R.'s; 81 miles north by west of Charleston and 50 miles south by east of Columbus. It was settled in 1735 by Swiss and Germans, was incorporated in 1755, and chartered as a city in 1870. It is in an agricultural and lumbering region. The chief manufacturing establishments are cotton mills, lumber and planing mills, a sash and blind factory, flour and grist mills, ice factory, brick works, wagon and carriage factory, and printing works. There are two colleges for colored pupils, one a State Industrial institution and the other under the auspices of the Methodist Episcopal Church. There are graded schools for both white and colored and seven churches. The four banks have a combined capital of $210,000, and the annual amount of business is about $1,500,000. The government is vested in a mayor, elected biennially, and a council of eight members, one half of whom are elected each year. There are only about 25 foreign born persons in the city. The city owns and operates the electric-light plant and the waterworks. Pop. (1890) 2,964; (1900) 4,455.

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Orangemen, an Irish secret political society, the membership of which is composed exclusively of Protestants. The association aims to support and defend the British sovereign, the Protestant religion, and the ultimate union of Great Britain and Ireland. The society is named in honor of William III., Prince of Orange. The members appear at first to have been known by the name of "Peep-of-day Boys"; but the rude and illiterate mob of Peep-of-day Boys made way for the rich and influential organization of the Orange Society. Every member must belong to a private or subordinate lodge, and can be admitted only on proof that he is over 18 years of age, a Protestant, and of known loyalty. Any member marrying a Roman Catholic is expelled. Three or more subordinate lodges constitute a district lodge. Next above the district lodge is the county grand lodge, then the grand lodge, and finally the imperial grand lodge, at the head of which is the imperial grand master, the chief and supreme head of the association. The society was founded in the north of Ireland in 1795, for the ostensible purpose of counteracting the Catholic secret societies known as Defenders or Ribbonmen. The first Orange lodge was organized in the village of Loughgall, County Armagh, 21 Sept. 1795. As nearly all the peasantry of the country belonged to one association or the other, and as feeling ran high, the northern counties were in a very unsettled state for a lengthened period. Whenever the opposite factions met in considerable force insults were exchanged, and riots attended with serious loss of life often ensued. The law was powerless against them, as witnesses were intimidated, and juries sometimes refused to convict offenders belonging to their own order.

In 1808 the society extended its work to England, and in 1821 a grand lodge was founded at Manchester, but was afterward transferred to London. The subject more than once was brought under the notice of parliament, especially in 1813, and in consequence the grand

lodge of Ireland was dissolved; but its functions in issuing warrants, etc., were discharged vicariously through the English lodge. The most memorable crisis, however, in the history of the society was the election of a royal duke in 1827 as grand master for England, and, on the re-establishment of the Irish grand lodge in 1828, as imperial grand master. The Catholic Relief Act of 1828 aroused the slumbering antipathies of creed and race, and the Orange association was propagated more vigorously than ever — not only in Wales and Scotland, but also in Canada and in the other colonies; and it extended its ramifications into the army. At this time the association numbered 20 grand lodges, 80 district lodges, 1,500 private lodges and 200,000 members. In Ireland in 1828 and 1829, numerous bloody conflicts took place in the counties of Clare, Armagh, and Fermanagh, in which considerable numbers were killed and wounded, and it was with some difficulty that the military succeeded in suppressing these disturbances. In 1834 it was discovered upon a parliamentary investigation that Orange lodges existed in 34 regiments of the army, and in the following year the duke of Cumberland, afterward king of Hanover, who had been elected imperial grand-master, was compelled to dissolve the society in Ireland. It was revived in 1845, and has at present many thousands of members in Great Britain and Ireland, in the colonies, especially in Canada, and in the United States. The Catholic Emancipation Act of 1829, the repeal movement of 1848, the disestablishment of the Protestant Episcopal Church in Ireland in 1869, and the Fenian and Nationalist associations were all warmly opposed by the Orangemen. In 1861 the membership in Canada and the United States aggregated 150,000. In New York, 12 July 1871, a serious riot took place and several persons were killed. Other serious riots occurred in Belfast in 1880 and again in 1886. Great demonstrations take place annually on 12 July, the anniversary of the battle of Aghrim and (reckoning by old style) of the Boyne, and where the Catholic and Protestant parties are both in considerable strength the processions of either party are apt to be the cause of serious disturbances. Consult: Lilburn, 'Orangeism; its Origin, Constitution and Objects' (1866); Lecky, 'History of England' (1878).

Orato'rians, or Congregation of the Oratory. See ORDERS RELIGIOUS; NERI, SAINT PHILIP; NEWMAN, JOHN HENRY.

Or'atories, The. See ORDERS, RELIGIOUS.

Orato'rio, in music, a sacred composition consisting of airs, recitatives, duets, trios, quartettes, and choruses, with full orchestral and sometimes organ accompaniment, and opened with an instrumental overture. The subject is generally taken from the Bible and the text is often in a dramatic form, as in Handel's 'Samson'; it sometimes takes the form of a narrative, as in 'Israel in Egypt'; at times it is of a mixed character, as in Haydn's 'Creation'; and sometimes it consists merely of detached pieces, as in the 'Messiah.' Its origin has been usually ascribed to Saint Filippo de Neri, who, in 1540, founded the Congregation of the Oratory in Rome, one of the objects of which was to deter the young from profane amusements by rendering religious services as attractive as possible. For this purpose they began by the introduction of canticles, spiritual songs, and choruses, and subsequently, to increase the attraction, Scriptural songs and incidents were formed into dramatic poems, written in dialogue and set to music by the best contemporary composers. These productions were recited and sung, with instrumental accompaniments, before and after the sermon. Stradella was one of the first of those who became celebrated for this exalted kind of composition, his oratorio of San Giovanni Battista being produced in 1670. The increasing popularity of the oratorio at length induced poets of eminence to supply suitable texts. The oratorio was introduced into England in 1730, when 'Esther' was sung in the chapel of the Duke of Chandos. It was performed by the children of the Chapel Royal in 1731, and in 1732 was publicly produced. This was followed by 'Deborah' in 1733; by 'Athaliah' in 1733; 'Saul,' and 'Israel in Egypt' in 1738; 'The Messiah,' 1742; 'Samson,' 1743; 'Judas Maccabæus,' 1747; 'Joshua,' 1748; 'Solomon,' 1749; and 'Jephtha' in 1752. Oratorios that have since appeared are: 'The Creation,' by Haydn (1798); 'The Mount of Olives,' by Beethoven (1803); 'The Last Judgment,' by Spohr (1825); 'Saint Paul' (1836) and 'Elijah' (1846), by Mendelssohn. Among oratorios by English composers may be mentioned: 'Eli,' and 'Naaman,' by Sir Michael Costa; 'John the Baptist,' 'The Resurrection,' 'Joseph,' and 'David,' by Sir G. Macfarren; and 'The Light of the World,' and 'The Prodigal Son,' by Sir Arthur Sullivan. In London and at the more important musical festivals throughout England, oratorios are performed on a large scale, and with a power, precision, and perfection unknown elsewhere.

Oratory, the art of speaking in public with eloquence and impressiveness; also the exercise of this art, and its product, eloquent speeches: the word is from the Latin *oratoria* or *ars oratoria,* from *orator,* and that from *orare,* to speak, to plead: the Greek word *rhetorikē,* rhetoric, has etymologically the same signification. Oratory was first made a subject of study among the Greeks settled in Sicily, the occasion of their directing their attention to it being the general unsettlement of all titles to property in Syracuse in consequence of the wholesale confiscations enacted by the three successive *despotæ,* Gelo, Hiero, and Thrasybulus, the last of whom was overthrown in 466 B.C., when a democracy was established. The exiles, on coming back to their country, appealed to the new government for restoration of their possessions, but that could be effected only by their appearing and appealing in person to the courts; for the profession of legal advocates was as yet a thing unknown: in suits at law no one was competent to plead whether on the side of the complainant or of the respondent save the respective parties themselves. Consequently the dispossessed found themselves in the necessity of making, each for himself, such plea for the restitution of his property as he could, though he might be wholly unacquainted with the art of pleading. In this emergency one Corax, by drawing up a few simple rules for the orderly and effective presentation of their claims, and drafting a skeleton of an address to the court, laid the foundation of the art of oratory on

which, 150 years later, Aristotle reared his immortal work on Rhetoric or Oratory, "incomparably," says Professor Jebb, "the most scientific work which exists on the subject: it may be regarded as having determined the main lines on which the subject was treated by nearly all subsequent writers"—of modern as of ancient times. But between the time of Corax and that of Aristotle was a period of development of the art, both in its theory and its practice, and that period is the golden age of Grecian, or rather Attic, eloquence. Corax had at the first mere imitators who developed the art of logography or of composing speeches or pleadings to be made in the courts by the parties to suits. The logographers then began to furnish to their clients, instead of the mere divisions and heads of a pleading, the whole speech written out, and trained their client in the memorizing and delivery of it. The first notable logographer at Athens was Antiphon (480–410 B.C.), but he had been preceded by a few years by the exceedingly brilliant but shallow sophist Gorgius, native of Leontini in Sicily, an orator and professor of oratory, who by his highly ornate style and his daring paradoxes commanded the interest of all and created a veritable furore: he exacted enormous fees for the privilege of attendance at his lessons in oratory, and had for his pupils the most gifted and aspiring of the Athenian youth. He does not appear to have committed to writing the secrets of his special art: he laid the principal stress on delivery, elocution, and proposed to his pupils as topics for declamation the philosophical speculations of the Eleatic school and others of an ethical nature. But Antiphon, though he was only a writer of speeches that were to be delivered by others, is reckoned as one of the ten great Attic orators. He composed speeches not only for parties in suits at law, but also for speakers in the popular assembly, and thus he is to be regarded as the founder of the art of political oratory at Athens. Never in his life till in its last act did he appear as a speaker in the assembly of the people or in the courts of law. When he was brought to trial on the charge of high treason he delivered in self-defense a speech, of which, though it proved ineffectual to save him from capital punishment, Thucydides declared that no abler oration was ever made by any man in a like position. There are extant 17 orations composed by him, among them three "tetralogies"—presumably examples of forensic oratory designed to serve as school exercises and models: each of the tetralogies comprises four speeches such as might be delivered in a trial for murder, namely, (1) the charge presented by the accuser; (2) the defendant's reply; (3) the accuser's answer to this; and (4) the rejoinder of the accused. The style of Antiphon's orations is rugged and lacks grace and elegance, as compared with that of most of his illustrious successors, but his discourse is ever forceful and convincing. Lysias, the third of the Attic Ten, was also a logographer, but he was besides a man active in public life, and in addition to orations prepared for clients to be delivered by them in the law courts or in the assembly, he composed and himself delivered a great many political and forensic speeches: more than 160 orations of Lysias are mentioned by ancient authors; of these, 34 are extant, a few of them in fragments. In his simple but refined style he presents a contrast to Antiphon: his vocabulary is simple and pure, the vocabulary of common life; he makes little use of showy rhetorical figures: he excels in vivid description; and he passes gracefully from the full and flowing periodic style to the style of simple narrative. He was the first to fit the style of the speeches he wrote to the character of the client, who was to deliver them before the court. Isocrates (436–338 B.C.), an eminent teacher of oratory, and one of the founders of the art in its highest development, was also by profession a logographer. Twenty of his orations are extant, marked by great elegance of style, but inferior in natural simplicity to those of Lysias, and in fire and fervor to the orations of Demosthenes. To Isocrates Cicero awards the praise of having brought Attic oratory to perfection. Among his pupils were very many who attained high eminence as orators: from the scant records that are extant are gathered the names of 41 famous orators who are known to have come from the school of Isocrates, among them the great Isæus (390–353 B.C.), who, like his master was a logographer and perhaps the most eminent representative of that profession: he was deeply learned in the law, and was also a great political orator: in forensic oratory he was without a peer. Demosthenes is said by some ancient writers to have been one of his pupils. With Demosthenes and Æschines closes the period of the grand Attic oratory.

After Greece fell under the Macedonian domination Grecian oratory had no longer any arena in public life and it degenerated rapidly. The tradition of the best days was, it is true, preserved in Aristotle's great treatise, and the monuments of Attic eloquence remained, but the virile eloquence of the great orators of Athens was ill fitted for the political circumstances of enslaved peoples. The taste for oratory was industriously cultivated by the Hellenes of Asia Minor and of the Greek cities as an elegant accomplishment, and in their hands it became merely one of the arts of decoration. A pompous, florid style, abounding in exquisite figures of speech, extravagant metaphors, and empty but sonorous periods displaced the sane, temperate speech of the Athenian masters and exemplars of oratory. And it was while Greek eloquence was in this low estate that the Latins first became acquainted with the arts of Greece. Fortunately the works of the great orators and of the great theoretic expositors of the art—Isocrates, Aristotle, Theophrastus—were still extant, in which was to be found the corrective of this debased Asian oratory; and it was the good fortune of the greatest of the Roman orators, when he resorted to the Greek schools for training in the liberal arts to have his studies from the first directed to the authentic works of those great masters, and not to the extravagances of the Asian school. Cicero's great rival in aftertimes, the orator Hortensius, was captivated by the glitter of Asianism, and sought to win verdicts in the courts by resonant sentences and flowery rhetoric rather than by clear, calm argumentation commended by a chaste, temperate style of speech. Cicero's orations, of which 56 are extant, are either deliberative and political, delivered in the Senate or the Forum, or judicial, forensic, all in defense of accused persons, with the exception of the memorable four ora-

tions against Verres, in which Cicero acts as accuser and prosecuting attorney. He wrote three treatises on the subject of oratory, *De Oratore, Orator,* and *Brutus,* and there are extant two other treatises relating to the art of oratory, *De Inventione* and *Rhetorica* which have been ascribed to him as author. In the treatise *De Oratore* he expresses his view of what the consummately accomplished orator should be: he must not be the mere rhetorician, neither should he be the mere technical lawyer or the keen political partisan; but he should be the man of thorough education and perfect taste, who can speak on all subjects out of the fulness of his mental store, with variety and copiousness. Such is Cicero's ideal orator, an ideal which unquestionably he approached as nearly as any orator in antiquity, though of course even in his time it stood immensely remote. Though Julius Cæsar, "the greatest name in history," was not by profession an orator, he has been justly rated as second only to Cicero as a master of the art of oratory: it is not to be doubted that had he devoted himself to forensic practice and the oratory of the Senate he would not have been inferior in that career to any of the great orators even of Athens: to Julius belongs the unique distinction of having quelled a rebellion by a speech. Quintilian, born about 80 years after Cicero's death, was a very eminent instructor in the art of oratory and wrote on the subject a practical systematic treatise, *De Institutione Oratoria,* remarkable for its sound criticism and faultless taste.

The triumph of Christianity was in part at least a triumph of oratory: the appointed chief means of disseminating the religion was preaching. The Apostle Paul was an orator of no mean rank. The apologies written in defense of the Christian religion in the 2d and 3d centuries and addressed, most of them, to the Roman emperors by Justin Martyr, Athenagoras, Melito, Apollinaris, Miltiades, Minucius Felix and others were, except that of the last named, in effect harangues written, not spoken: the style is the oratorical style, but it is oftenest of the debased Asian kind. Many of the Fathers of the Church, as Tertullian, Cyprian, Athanasius, Basil, Cyril of Jerusalem, the Gregories (of Nazianzum and of Nyssa), Augustine, Ambrose, were eminent as orators no less than as theologians and controversialists. In the Middle Ages the art of oratory played no inconsiderable part when employed for religious instruction or moral exhortation by Bernard, Dominic and his Preaching Friars, Bonaventure, Thomas Aquinas, Berchthold of Ratisbon, Vincent Ferrer, Tauler, etc.

Political oratory was meanwhile in abeyance: it had its revival in England in the times succeeding to the Revolution of 1686: since that time the English bar and the British House of Commons have been almost continuously illustrated by the genius of orators hardly or not at all inferior to those of ancient Athens. It was a crisis in the affairs of the little Syracusan Democracy that gave occasion for the first essay to formulate the laws of the art of oratory; and it is in great crises of states that the highest powers of oratory are called into action. And as in England the question of war against the American colonies, the misdeeds of proconsuls in India, the war with Revolutionary France, Catholic Emancipation, Abolition of the Corn Laws, Liberation of the Blacks, etc., gave inspiration to orators; so here in the United States the questions of Independence, of forming a Constitution, of Nullification, of Abolition of Slavery, of maintaining by arms the Union, of Tariffs, etc., have called into exercise the oratorical powers of our Henrys, Otises, Hamiltons, Clays, Websters, Sumners, Phillipses.

Or'atory of Saint Philip. See ORDERS, RELIGIOUS.

Orb-weaver, a spider of the group *Orbitellariæ,* represented most familiar by the garden spiders of the family *Epeiridæ,* which form their webs on a flat plane in the form of concentric lines of thread sustained by cables radiating from the centre of the coil to various points of support. See SPIDER.

Orbegoso, Luis José, loo-ēs' hō-sā' ōr-bā-gō'sō, Peruvian general: b. Chuquisongo, Huamachuco, Peru, 25 Aug. 1795; d. Lima, Peru, 1847. He was educated in the College of San Carlos, Lima, and entered the militia in 1815. He was a man of wealth and high position and, engaging actively into military and political affairs, attained great popularity among his countrymen. In 1833 he was chosen president of the republic and though the election was not strictly legal he held the position without interference until 1834 when his predecessor, Gamarra, raised a rebellion against his authority. Several revolts followed and Orbegoso was defeated. He accepted the intervention of President Santa Cruz of Bolivia, and the Peru-Bolivian confederation was formed with Orbegoso as president of North Peru. When the alliance was dissolved in 1836 he was exiled by Gamarra and his followers, but returned to Peru several years before his death.

Or'bis Pic'tus. See COMENIUS, JOHANN AMOS.

Or'bit, in astronomy, the path of a planet or comet; the curve-line which a planet describes in its periodical revolution round its central body. The orbits of the planets are elliptical, having the sun in one of the foci; and the planets all move in these ellipses in accordance with the law that a straight line drawn from the centre of the sun to the centre of any one of them, termed the radius vector, always describes equal areas in equal times. Also, the squares of the times of the planetary revolutions are as the cubes of their mean distances from the sun. The satellites also move in elliptical orbits. See ASTRONOMY.

Orca, a genus of whales. See KILLER.

Orcagna, ŏs-kän'yä, or **Arcagnolo,** är-kän-yō'lō, easel names of Andrea di Cione, Italian painter, sculptor and architect: d. probably 1368. He belonged to the school of Giotto as a painter, but his energy and dramatic characterization indicate a great advance on the flatness and conventionality of the Giottesque style. His main works are three large frescoes: 'The Last Judgment'; 'Hell'; and 'Heaven' in the Strozzi chapel of Santa Maria Novella at Florence. In the same chapel is an altar-piece marked with his name and the date 1357; it represents Christ handing the keys to Peter and a book to Thomas Aquinas. In the London National Gallery is his 'Coronation of the Virgin by Christ,' a large altar-piece which originally belonged to the Church of San Pietro Maggiore

at Florence. All these works exhibit powers of exquisite design, graceful composition, and delicacy of coloring. The proportions of the chapel of San Michele and its elaborate tabernacle furnish a magnificent testimony to his powers as a sculpture and architect.

Or'cein, $C_7H_7NO_3$, the chief ingredient of the red and purple dyestuffs known under the name of archil (q.v.). It is formed by the action of ammonia and oxygen on orcin, $C_7H_8O_2$, and consists of two substances, one having the composition $C_{14}H_{13}NO_4$, the other $C_{14}H_{12}N_2O_3$. When ammonia is added to a solution of orcin, and the whole is exposed to the air, the liquid assumes a dark-red or purple tint by the absorption of oxygen. On acidulating with acetic acid, a dark-red precipitate of orcein is obtained. Orcein is slightly soluble in water and freely soluble in ammonia and fixed alkalies, with a purple or violet color; it is very soluble in alcohol.

Orchard Culture, An orchard is a collection of fruit-bearing trees, especially of those bearing deciduous fruits, as the apple, pear, peach, plum, cherry, apricot, and quince; for oranges, olives and various cultivated nuts, the term "grove" is probably in more general use. American orchard culture differs widely from European. European conditions require conservation of space and make necessary such artificial methods of training as dwarfing, training upon walls, forming cordons, espaliers, etc.; also that the fruit itself shall be of special attractiveness with respect to size, color, flavor, or some other desideratum. As a result, far more hand-work is required in European fruit plantations than in American. In America the intensive methods of Europe are rarely practised, since land is plentiful and cheap, and since the demand is for a large quantity of fruit rather than for fruit of exceptional quality. The trees therefore are left more nearly to nature, aided by as little hand labor as possible. As a consequence the orchards of America are the most extensive in the world. According to the United States census in 1899 the total number of fruit trees in orchards was 367,164,694, of which 55 per cent were apple, 27 per cent peaches and nectarines, 8 per cent plums, and 4.5 per cent pears. In that year the yield of fruit was valued at $83,751,840.

During the closing quarter of the 19th century, and especially during the last decade, the management of American orchards was decidedly improved. Prior to that orchards were largely mere adjuncts of the farm, supplying little more than the home need, or at most the small demands of local markets. As a result the trees were allowed, usually, to shift for themselves; harmful insects thrived, plant-diseases spread and the quality of the product was poor. As means of shipment of fruit were improved more distant markets could be supplied and the progressive men began to devote attention to their orchards. Great care is now taken in the selection of land and site for an orchard; not only must the tree be considered with respect to its nourishment, but the effects of cold, heat, wind, light and other factors must be kept in view. For instance air drainage has been found to be of equal importance to water drainage. Orchards planted in hollows generally fail because of the settling of cold air from the high ground, and good managers now avoid a situation where no draft of air will tend to keep the trees clear of such chilling influences. The land selected is thoroughly prepared by plow and harrow before the trees are planted, instead of placing them in separate holes dug in the sod. The trees planted, rarely more than two years of age, are carefully trimmed root and branch, and set in rectangles or hexagons, the latter method permitting cultivation in three directions and being more economical of the land. Instead of allowing the land to grow up with weeds and grass as formerly, modern practice keeps it cleanly cultivated until midsummer, and in many cases a "cover-crop" is planted for plowing under as a green manure in the following spring. During the first three to six or perhaps eight years, according to the kind of fruit, distances between trees, etc., many orchardists plant hoed crops between the trees to offset the cost of cultivation. Cereals and grasses are modernly almost never sown in orchards except to reduce the amount of nitrogenous food in the soil and then only when such food is so abundant that the trees are making too great a growth of wood to allow of profitable productivity. The cover-crops act more or less as checks to growth and thus help in the ripening of the wood and the buds. They also serve to hold snow, and to check washing, puddling and leaching of the soil, and if they consist of beans or similar legumes, they enrich the soil with nitrogenous food derived from the air.

Thinning of the fruit has been found of distinct advantage with many kinds, especially when the grower aims to supply the annually increasing demand for finer individual specimens. The objects gained are the removal of inferior, diseased specimens, the destruction of many insect pests, and the saving of plant-food which can be utilized by the tree in the development of finer fruits or other parts. It is practised most with such fruits as peaches, pears and apricots, these supplying a fancy market; but is also gaining in favor with apples, plums and even cherries. Often the practice removes two thirds of the fruits set. But the number lost is usually more than offset by the increased bulk of the crop matured, and by the resultant price.

Whereas fruits, even peaches, were formerly marketed in bulk, they are now shipped in small individual packages, even apples being sent to market more and more in smaller packages than barrels. This change has been brought about by the demand of consumers who dwell in cities, where they have small facilities for keeping perishable food-materials and must buy their fruit in small quantities, more often than in large amounts. Means of transportation and storage facilities have developed in pace with this change in the market. Refrigerator cars have made possible the carriage of products hundreds, or even thousands, of miles to a final market, and the erection of cold-storage warehouses at both the shipping and the receiving ends of the line has enabled producers and dealers to control the supply and regulate prices to a great degree. The disadvantage in such a method of marketing fruit is the poor quality of fruits shipped long distances; they must be gathered before their flavors have fully developed, and the con-

sumer never learns from the fruit obtainable in his distant market what the fresh article is like.

Consult: Bailey, 'Cyclopedia of American Horticulture' (1900–2), and 'Principles of Fruit Growing' (1900); Thomas, 'The American Fruit Culturist' (1897); and many bulletins of the agricultural experiment stations, especially New York, Michigan, Wisconsin, California, and Vermont; also the annual reports of horticultural and pomological societies, particularly the American Pomological Society, Western New York, Massachusetts, Michigan, and Missouri Horticultural Societies.

See FRUIT; FRUIT TRADE; FERTILIZERS; FUNGICIDES; TILLAGE; etc.

Orchard Grass. See GRASSES IN THE UNITED STATES.

Orchard Oriole. See ORIOLE.

Orchardson, ôr'chard-sŏn, **William Quiller,** English painter; b. Edinburgh 1835. He entered the Trustees' Academy of that city at 15, and encouraged by the success of some pictures exhibited in the Royal Scottish Academy's exhibitions, went to London in 1863 where he contributed to the Royal Academy and other art exhibitions. In 1868 he was elected an associate of the Academy, and in 1877 became an Academician. Orchardson's works consist almost entirely of historical and genre pictures and portraits. Some of his chief works are: 'The Challenge' (1865); 'Christopher Sly' (1866); 'Napoleon I. on Board H.M.S. Bellerophon' (1880), purchased under the terms of the Chantrey Bequest; 'Un Mariage de Convenance' (1884); 'Salon of Madame Recamier' (1885), in which many distinguished persons are introduced; 'The Rift within the Lute' (1887); 'The Young Duke' (1889); and portraits of the Bishop of St. Asaph, Prof. Dewar, Viscount Peel, Lord Kelvin, and others. Almost all his paintings appeared in the Royal Academy exhibitions. He is a painter of brilliant technique with few rivals in certain effects of color and chiaroscuro, but his work sometimes may be said to lack solidity and depth.

Or'chestra, a term applied to the space in theatres between the seats occupied by the spectators and the stage, appropriated by the Greeks to the chorus and the musicians, by the Romans to the senators, and in our modern theatres to the musicians. The name is also used for the part of concert-rooms assigned to the vocal and instrumental performers; and, lastly, is applied to the instrumental performers, collectively taken. A modern orchestra in the last sense consists of stringed, wind, and other instruments, in varied proportions, according to the number of instrumentalists. The stringed instruments should greatly outnumber the wind instruments. A very effective small orchestra for a moderately sized concert-room may be made up of the following proportions: Six first violins, five second, three altos, two violoncellos, two double-basses; two flutes, two oboes, one clarionet, one bassoon, one cornet, one trombone, two horns; and one kettle-drum — twenty-nine instruments in all. The trombone may be left out without sensibly lessening the efficiency. See BAND; MUSIC; VIOLIN; etc.

Orches'trions. See MUSICAL INSTRUMENTS, MECHANICAL.

Orchha, or **Urchha** (also called TEHARI), a native state of Central India, area about 2,000 square miles; pop. 333,020. The town of Orchha, the former capital, is on the river Betwa, not far from Jhansi. It contains an imposing fort with a palace. The town of Tehari, the present capital, the residence of the ruling chief, is about 40 miles south of Orchha. It contains the fort of Tikamgarh, by which name the town is sometimes called. Pop. 17,610.

Orchid, ôr'kĭd, the name of a group of plants (order *Orchidaceæ*) containing more than 12,000 known species and many thousands of varieties, many of which are highly valuable commercially. They are as a whole by far the most interesting order of plants of the entire vegetable kingdom, because of their extraordinary mode of growth and existence, their great age and endurance, their curious habits, and the varied forms of their flowers, which are distinct from all other classes of plants, fine in texture, and of glowing and exquisite colors. They are remarkable also because of their ready adaptability and free permission of cross-breeding or cross-fertilization, which also practically makes them more fascinating than all other orders or tribes of plants. This is true in their natural habitat, as well as under practical cultivation. This fact also accounts for the almost endless varieties of flowers and colors.

The flower of the orchid as a rule is made up of the following parts: sepals, petals, labellum or pouch, and column or crest. The labellum is as a rule the most conspicuous part, and is the most wonderfully constructed, as well as the most important, organ of the flower, since through it insects, when in search of the sweet juices stored inside the spur or walls of the flower, are attracted and guided to the nectar and thus accomplish the benefits of cross-fertilization. It is in this way that so many new varieties are produced by the unconscious work of insects, and these are termed "natural hybrids" and are collected and brought to us from tropical wilds. But under cultivation this important work must be done by experts, using delicate camel's-hair brushes, and with a most careful eye and judgment as to the proper time. It is in this manner that the most beautiful hybrids have been obtained, known as "garden hybrids."

Orchids are distributed over a large area of both the Eastern and Western hemispheres, and are divided into two general groups,— the East Indian and the South American. They are also classified according to their habit of growth and subsistence, as saprophytic, epiphytal and terrestrial. The first-named class includes the more inferior species, which grow mostly in wet and marshy places, and, commercially speaking, are of little value except for botanical purposes. The epiphytal group is by far the most valuable and most important of them all in every respect. The species of this section are often erroneously called "parasites," when it is a fact that not one of the whole orchid family is really a parasite. Nearly all the members of this class grow and thrive best upon the trunks and limbs of trees in mid air, simply clinging to a single stem or small limb, and, therefore, sometimes quite properly called air-plants. It is this group, too, which contains the most beautiful and most valuable species and varieties and the most varied colors. Their natural habitats are generally confined to

tropical and subtropical climates in both hemispheres, where the moisture-laden and humid atmosphere affords the most congenial nourishment to these wonderful plants. Several epiphytal orchids are found in the extreme southern parts of the United States, some of which are highly interesting and fairly valuable.

The terrestrial orchids are such as grow upon the ground and, therefore, have no need of the pseudo-bulbs or terrated stems, which are peculiarly characteristic of the epiphytal section.

Of the other two classes, Saprophytes and Terrestrial, many varieties are indigenous throughout the United States, even as far north as Vermont and southern Canada. These are what are known as the hardy native varieties, which have their resting season during the winter months, while all the epiphytal (sometimes called celestial) orchids, which are found only in tropical climates, have their periods of rest during the dry season. Therefore the cultivator of these plants under glass must imitate nature as near as possible, giving them their season of rest after their new growth is finished, when water should be withheld gradually and only enough moisture applied to keep them alive until nature itself shows signs of fresh activity. This is the time the plants start in to develop and bring forth their flowers upon and from their previously matured and ripened growths or pseudo-bulbs, when moisture is again applied gradually, increasing the supply from day to day; and it is at this period that keen judgment must be exercised.

During the past ten or fifteen years orchids have become one of the most fashionable classes of plants — in fact no other flower has ranked so high in favor or is appreciated more to-day by the better and more highly cultured and æsthetic class of people both in Europe and America than is the orchid. From a commercial standpoint no flowers command the prices for floral decorations, both as plants in bloom and as cut flowers, equal to those of the many beautiful varieties of orchids which are now cultivated. Millions of dollars' worth of these plants are now in cultivation, both in commercial as well as in private collections, although 25 years ago very few practical gardeners knew much about their cultivation; previous to 1880 it was a rare treat to see even a few of the very ordinary varieties in bloom, and then usually only in private conservatories; scarcely any commercial collections existed. Every year the demand is increasing, and thousands of dollars' worth of these rare plants are imported annually from South American countries, the East Indies, the Philippines and even from Australia. To keep up the supply many practical and experienced collectors are sent out to these distant tropical countries to gather the plants, and the time is fast approaching when it will be almost impossible to collect any more plants within reasonable reach. In fact, so great has been the traffic that several South American governments have put an export duty upon the plants, while others have prohibited their further collection and exportation, entirely from fear of their total extinction.

This state of affairs has brought about the raising and cultivating of thousands of seedling orchids since 1895, and with it the crossing of desirable species and varieties in order to obtain a better and improved class of plants and more beautiful types of flowers. But this is a very slow process, and great patience and many years of time and labor are required to bring them to flowering maturity and size. Carnations and other flowers can be raised in a single year, and even roses in two or three years, but it requires from five, ten or fifteen years to raise orchid plants fit for blooming purposes, so that we may never expect to see orchids in over abundance or a so-called drug on the market.

Treatment and Culture.— It is by no means as difficult a task to grow and cultivate these interesting plants as was supposed when orchids were first introduced to the public in this country during the year 1887, when a prominent florist, who practically is the pioneer in orchid culture, gave the first exhibition of these plants in mid winter in the city of New York. This was followed by annual exhibitions for several years, and people became interested in these wonderful plants. It was then thought next to impossible for anyone except an experienced gardener to manage them, and also that it would require specially constructed greenhouses; but many fine flowers have been produced by laymen in ordinary greenhouses — even in light and sunny windows many varieties thrive so well that thousands of people are cultivating orchids there. They, like other tropical and semi-tropical plants, require plain but careful treatment. They can be grown in ordinary flower-pots in a compost of a certain fibrous peat. The lower half of the pot is to be filled with potsherds and pieces of charcoal intermixed; then place the roots and rhizome of the plant in the peat, and fasten and pack it well. These plants can also be grown in earthen pans or wooden cribs, so that the plants may be thus suspended from the ceiling or in the windows. They require a continuous temperature of from 55 to 70° F., not lowered during the night. Water should be applied sparingly at first, when the plants start into growth, and gradually increased as the plants require it. Frequent spraying or syringing, especially during the spring and summer season, is highly beneficial. This should be done, however, in early morning or after 3 o'clock in the afternoon. In the winter or during their time of rest, when the recently made new growth is maturing, water must be given with judgment and only enough to keep them from shriveling.

Nearly all orchids delight in sunlight, but of course are not to be exposed to direct burning hot sunshine. A judicious shading is beneficial to their welfare. If such treatment is observed the plants, if healthy and thrifty to start with, will grow and flower as successfully as any other plants.

Following is a list of the most popular varieties of orchids named in the order of their commercial importance, with the countries from which they are obtained.

Cattleya.—The orchids of this genus undoubtedly rank as the most popular and most valuable among all orchids. They also contain more species and varieties than any other, and are confined entirely to South America, where they are known by their common name of "fleur de mayo," because the majority of these varieties produce their gorgeous flowers in the

ORCHIDS.

2. Odontoglossum.

1. Lady's Slipper.

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month of May, generally the beginning of the wet season. Following are the principal named varieties:

C. mossiæ, C. speciosissima, C. percevilliana, and *C. lawrenciana,* all of Venezuela; *C. labiata, C. warnerii, C. schroederii, C. harrissonii, C. intermedia, C. gaskelliana,* and *C. leopoldii,* each Brazilian, and several other kindred varieties; also *C. triannæ* (and many varieties), *C. mendelii, C. gigas,* and varieties, all of the Andes or New Grenada; *C. maxima,* of Peru; *C. dowiana,* one of the most valuable and richly colored species, of Costa Rica; *C. citrina,* of Mexico; *C. skinnerii,* of Guatemala and Costa Rica; and *C. bowringiana,* of Honduras.

Lælia.— This genus is closely allied to *Cattleya,* and includes the following species: *L. purpurata,* often called "queen of orchids," a native of Brazil; *L. elegans,* and its varieties; *L. harpophilla* and others, also of Brazil; *L. anceps* and its many varieties; *L. autumnalis, L. gouldiana, L. alba, L. albida, L. majollis, L. digbiana,* all of Mexico.

Oncidium.—This genus embraces many beautiful and valuable species and varieties, among which the following are most prominent: *O. varicosum* and *rogersii,* the golden butterfly orchid; *O. kramerii,* mottled butterfly; *O. sarcodes, O. macranthum, O. marshallianum* and many others, all of Brazil; *O. papilio,* the "butterfly" of the West Indies and South America; *O. splendidum* and *O. cavendishianum* of Mexico and Guatemala; *O. tigrinum* of Mexico, and many others.

Odontoglossum.— This genus includes some of the most beautiful and grandest orchids in existence, and the only difficulty is that up to the present time their successful cultivation under glass is still unsolved in this country, although they are very successfully grown in some sections of Europe, where they command a higher value than almost any other orchid. The most important varieties of this species are: *O. crispum, O. pescatoræ, O. albopurpurea, O. harryanum,* and kindred varieties, all of New Grenada or Colombia; *O. grande,* the "baby" orchid of Guatemala and Mexico; *O. citrosmum,* of Guatemala, and *O. inscleyii leopardinum,* of Guatemala and the Pacific slope of Mexico.

Peristeria.— Flower of the Holy Ghost (*Peristeria elata*), of Central America.

Lycasta.— Several species of Guatemala and Mexico.

Catasetum.— These are South American and more interesting than beautiful, except *C. bungerothii,* which is ivory white and very fragrant.

Stanhopia.—A genus including one of the most curious of orchids, throwing its sweet-scented large flowers from the rhizome downward through its receptacle. Some six or seven varieties exist, natives of South and Central America.

Chysis.— Four or five species are found in Guatemala and Mexico, very curious plants and flowers, one of which is the "laughing orchid."

Schomburgkia.— A genus of very large and curious plants with great flowers. *Schomburgkia crispum* and *S. undulatum* are well known species of South America and the West Indies.

Masdevallia.— A very curious genus with numerous varieties, bearing highly interesting flowers.

Epidendrum.— A very large genus with many valuable and showy varieties, nearly all of which are highly epiphytal in character. Many of this group are not very desirable.

Of East Indian orchids, first in importance is the genus *Dendrobium,* a very large and valuable group, which includes a large number of species and varieties, all of which are found in the East Indies, Moulman, Assam and Burma, except two, found in Australia. The principal species are as follows: *D. nobilis* and its many sub-varieties; *D. wardianum, D. crassinoide, D. chrysotoxum, D. thyrsiflorum, D. densiflorum, D. devonianum, D. falconerii, D. farmerii, D. chrysanthum, D. dalhousieanum, D. formosum,* and many others of less importance, except *D. bigibbum* and *D. phalænopsis* of Australia.

Phalænopsis.— A genus of East Indian species called moth-orchids. This is one of the very rarest and most valuable genera and also the most difficult group to cultivate successfully, but their beautiful and really fantastic miniature bird-like flowers render them very desirable. Most of them are natives of and found in the Philippine Archipelago, and in Burma and Siam. Following are the most valuable varieties: *P. amabilis, P. grandiflora, P. schillerianum, P. sanderianum, P. luddemanniana, P. casta, P. stuartianum, P. violacea.*

Vanda.— This genus represents the tribe or order of *Vandacea,* which includes the *Ærides, Saccolabium,* and *Angræcum.* Prominent species are *Vanda cærulea, V. tricolor* and its varieties; *V. insigne, V. lowii, V. batemanii, V. cathcartii, V. sanderiana, V. teres, V. kimballiana, V. amesiana; Æerides odorata, A. fieldingii, A. lobbii, A. virens* and many others; *Angræcum sesquipidale, A. eburneum-virens, A. articulatum, A. ellissii* and *A. leonii; Saccolabium giganteum, S. blumei, S. guttatum, S. ampulaceum* and others. Other semi-terrestrial forms are *Calanthe veitchii, C. vestita* (varieties *occulata* and *rubra*), *A. turnerii, A. regnierii, A. gigantea* and a few other hybrids; *Cymbidium lowianum, C. eburneum, C. giganteum,* and *C. mastersii; Cœlogyne cristata, C. alba* (rare), *C. lemoniana, C. flaccida, C. dayiana,* and *C. pandurata; Phajus grandiflora, P. tuberculosa, P. wallichii, P. maculatus* and *P. humboldtii.*

Cypripedium.— This genus, embracing the ladies' slipper, or slipper orchids, is the most important group of terrestrial orchids, and includes a vast number of species from which have been raised a greater number of rare hybrid varieties than from any other class. While not as showy as many of other genera they are highly interesting to the hybridist, and from this standpoint are very valuable. Sometimes a single small plant of a new hybrid will sell for $500.

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Orchis, the typical genus of the order *Orchidaceæ.* The roots of several species, as those of the *O. mascula* and *O. morio,* when dried, form the European or indigenous salep. That prepared from the first-named species is said to be the best. Salep contains the principle called bassorin and a little starch, possessing similar properties to those of starchy and mucilaginous substances generally.

Or'chil. See ARCHIL.

Orchomenus, ôr-kom'ĕ-nŭs, Greece, (1) an ancient Bœotian city, capital of the kingdom of the Minyæ, situated at the northwestern corner of Lake Copais (now Topolia) where it is joined by the Cephissus. The town extended from the marshy edges of the lake up the face of a steep rock hill, on which stood the acropolis. It sent 30 ships to the Trojan war, and at a later date became a member of the Bœotian confederacy. Its government was thoroughly aristocratic, and after the Peloponnesian war the jealous democratic Thebans destroyed it by fire, and sold its inhabitants as slaves. It was rebuilt in the reign of Philip of Macedon, but never recovered its position. It was famous for its musical festival in honor of the Graces, who were specially worshipped in the city. In 1880 Schliemann excavated there a royal tomb or mausoleum, larger than the "Treasury of Atreus" at Mycenæ (q.v.). (2) a former city in Arcadia north of Tripolitza, on a hill dominating the road to the north. During the wars of the Macedonians and Achæans it was a fortified post of considerable strategic value.

Orcin, ôr'sĭn, in chemistry, also called orcinol, $C_7H_8O_2$. It exists ready formed in some of the lichens which produce colorless matters themselves, but which yield coloring substances by reaction with water, ammonia or air. Orcin is also prepared artificially from orsellic acid by boiling in water, $C_8H_8O_4 = C_7H_8O_2$ (orcin) $+ CO_2$. On evaporation the orcin crystallizes in the form of colorless, six-sided, monoclinic prisms, which are soluble in water, alcohol, and ether, and have a nauseous sweet taste, but no odor. In the hydrated state it melts at 58° C., and in the anhydrous state at 108° C. It is a di-oxy-toluene represented by the formula $C_6H_3(CH_3)(OH)_2$. It yields rhombic crystals and forms substitution products with bromine, chlorine and iodine. Orcin gradually turns red on exposure to the air.

Orcus, ôr'kŭs, the Latin name for Pluto, hades, or the infernal regions. See PLUTO.

Or'cutt, William Dana, American author: b. West Lebanon, N. H., 18 April 1870. He is general manager of the University Press, Cambridge, Mass., and has published 'Good Old Dorchester,' a narrative town history (1893); 'Princess Kallisto' (1903); 'Robert Cavalier: the Story of the Romance of the Sieur de La Salle' (1904).

Ord, ôrd, **Edward Otho Cresap,** American soldier: b. Cumberland, Md., 18 Oct. 1818; d. Havana, Cuba, *22* July 1883. He was graduated from West Point in 1839 and served in Florida and in California until the outbreak of the Civil War when he was promoted brigadier-general of volunteers and assigned to a command in the Army of the Potomac. In 1862 he was made major-general and transferred to a command under General Halleck and distinguished himself under Grant at Corinth. He was present at the capture of Vicksburg and in 1865 was appointed to the command of the Army of the James and the Department of Virginia with which he was present at the capture of Richmond. Subsequently he was given charge of the Department of the Ohio and in 1866 he was mustered out of the volunteer service. He remained in the Regular Army in command of the Departments of Arkansas, California, Platte, and Texas successively and in 1881 was retired with the rank of major-general.

Or'deal, certain acts which a person suspected of crime was made to perform solemnly and which would in the ordinary course of things be hurtful or fatal to him; if, however, he performed them without being injured, he was declared to be innocent. These tests were called ordeals or judgments of God. As the results of them often depended on those who made the preparations, there was abundant opportunity for deceit and malice.

The following ordeals were anciently in vogue throughout Europe: The duel or wager of battle (see COMBAT), in which the conquered was held guilty; the ordeal of fire; of water; the corsned; the trial of the eucharist; the test of the cross; and the judgment of the bier. In the ordeal of fire the accused walked barefooted over coals of fire, or over red-hot plowshares; or had to carry a red-hot iron in his hand; or was made to walk through fire, in the last case he was dressed in cloth covered with wax (the trial of the waxen shirt); if he was unhurt by the fire, and the wax unmelted, he was considered innocent. In the trial by cold water (often applied to witches) the test would be whether the accused sank or floated; if the latter, he (or she) was guilty; or the suspected party had to put his hand into boiling water and lift something out. In the corsned trial a priest put the corsned, or hallowed bread, into the mouth of the accused, with various imprecations. If the accused swallowed it he was freed from punishment. The test of the eucharist was applied chiefly among the clergy and monks. When they took the host it was believed that God would smite the guilty with sickness or death. In the trial of the cross, the accuser and the accused were placed under the cross with their arms extended or cross-wise, and who first moved his hands or suffered them to fall was held to be guilty. Or the accused was placed before relics, and two dice were then produced, one marked with a cross. Of these one was taken up at hazard. If it happened to bear the sign of the cross the accused was acquitted. Finally the judgment of the bier was used in the trial of murder; the murdered person was placed upon a bier and the accused made to touch the body. If blood flowed out, or foam appeared at the mouth, or the dead body changed its position, the suspected person was considered guilty. Superstition and artifice gave to these ceremonies the highest authority; and even the emperors were unable to abolish them. The papal chair restrained them by improving the judicial system; after the 14th century ordeals became uncommon, and in the 15th they were superseded by the canon law, which invented the oath of purgation, by which the accused was acquitted on a solemn declaration of his innocence. The universal use of the Roman law also tended to abolish trial by ordeal. In the 16th century only the trial of the bier survived, and this continued even to the 18th. Besides this ordeal of cold water for sorcery (found in Prussia in the 17th century and in the neighboring countries in the first half of the 18th), witches were weighed, and if found to be light they were pronounced guilty. These foolish customs were gradually

done away, when Thomasius (see THOMASIUS, CHRISTIAN), succeeding in almost wholly annihilating the belief in witches. Yet as late as 1728 witches were weighed at Szegedin in Hungary. Roman law substituted in their place an equally cruel process, namely the torture. Ordeals are still found among all the negro nations north of the Zambesi. When a man suspects that any of his wives have bewitched him, he sends for the witch doctor who makes an infusion of the plant called *goho*. His wives all drink it, each one holding up her hand to heaven, in attestation of her innocence. Those who vomit it are considered innocent, while those whom it purges are pronounced guilty and burned to death.

Some negroes on the coast of Guinea put into the hands of the accused herbs and barks of a peculiar character and suppose they have the property of burning the guilty. Ordeals of various kinds, but chiefly the trials by fire and by water, are found among the Chinese, the natives of Pegu, of Kongo, of the coast of Guinea, and the tribes of Asiatic Russia. In Senegambia an application of red-hot iron is made to the tongue of the supposed criminal. In Siam the accuser and the accused were placed together in one spot, and a tiger was let loose upon them. If one was spared, he was considered innocent; if both were destroyed, they were both deemed guilty; and if both were spared, they were compelled to undergo some more certain test. In eastern Africa, among the Wanaka tribe, are the ordeals of the hatchet, of the copper kettle, of the needle, and of the piece of bread. The first two were analogous to the hot iron ordeal and the last to the corsned of Europe. In the ordeal of the needle, a red-hot needle was drawn through the lips of the alleged criminal, and if blood flowed from the wound, he was deemed guilty; but if none, innocent. In Madagascar the trial by ordeal is still generally practised by legal authority. The supposed criminal is made to drink a decoction of a poisonous fruit called the *tangena*, a small dose of which acts as an emetic, while a large dose is fatal. By managing the size of the dose, those who administer it can decide the result.

Or'der, in zoology, a division in classification greater than a family and less than a class. It is based upon broad criteria of structure. The principal orders in the animal kingdom are enumerated in the Table of Classification in the article ANATOMY, COMPARATIVE.

Order of B'nai B'rith. See B'NAI B'RITH.

Order, Brith A'braham, an American benevolent and fraternal society organized in 1850. In 1903 it had a grand lodge, 267 sublodges and 40,056 members. In 1902 the benefits disbursed amounted to $153,500.

Order of Bucks. See ODD FELLOW.

Order of Independent Odd Fellows. See ODD FELLOW.

Order of Preachers. See DOMINICANS.

Order of Saint John of God. See ORDERS, RELIGIOUS.

Order of Saint Joseph. See ORDERS, RELIGIOUS.

Order of the Snare of Love. See ORDERS, ROYAL.

Order of Solomon's Seals. See ORDERS, ROYAL, *Abyssinia.*

Order of United American Mechanics. See UNITED AMERICAN MECHANICS, ORDER OF.

Orders in Architecture, the different styles of classic architecture as distinguished by the character of the column, its base, shaft, capital and the superimposed entablature. These elements constituting the unit of a colonnade are taken account of in distinguishing the various orders, of which there are five, the Doric, Ionic, Corinthian, Tuscan and Composite. Each type of the column seems to have persisted in its main characteristics from the earliest times while undergoing minor modifications in the way of refinement in proportions and details.

The column of the Doric order presents a tapering shaft resting upon the stylobate or platform. The shaft generally consisted of several parts called drums but in rare instances it was monolithic. It was grooved with semi-elliptical channels meeting in a sharp edge or arris. Surmounting the shaft the capital consisted of a circular cushion or echinus, so named from the sea-egg from which its curve was derived, and a square flat stone called the abacus. The capital formed the support for the entablature, comprising the architrave, frieze, and the cornice. The architrave or epistyle was the first series of horizontal stones, usually unornamented, and forming a solid basis for the frieze above, which was divided by alternating parts called triglyphs and metopes. The triglyphs were blocks, slightly projecting, carved with two vertical grooves and chamfered edges. These, save the two end ones, were placed above the centre of the columns and in the space midway between. The metopes were intervening square panels, often carved with architectural sculpture. Resting on the frieze was the cornice, consisting of a series of projecting moldings, the under side of the bed-molding being ornamented with square mutules having each eighteen guttæ depending from its under side. The gutter molding above protected the sculptured metopes from water.

The Ionic order, a development of the 5th century B.C., was characterized by greater slenderness of proportion. The shaft was placed upon a base composed of one concave and two convex moldings of semicircular profile; these in turn sometimes rested upon a square base block or plinth. The fluting of the shaft was semicircular, consequently deeper than the Doric, and was separated by fillets. The capital comprised a bead, an echinus, and an upper and characteristic band ending on both sides in a volute or scroll. The entablature was formed by an architrave of two or three flat faces and a frieze without triglyphs. The superimposed moldings introduced a new feature in the row of narrow blocks or dentals under the corona.

The Corinthian order was a late development of the Ionic, resembling it in base and shaft, but differing in the form of the capital, which was ornamented with circlets of acanthus leaves surmounted by branching scrolls meeting at the corners in spiral volutes.

These three orders were invented by the Greeks, but were appropriated by the Romans who modified them in certain unessential details into types that pass as Roman Doric, Roman Ionic and Roman Corinthian. The latter,

however, was the favorite order of Roman architecture. To the Romans belong, in addition, two other orders; the Tuscan, resembling the Doric, but without flutings in the column or triglyphs in the cornice; and the Composite, whose capital consisted of volutes modified from the Ionic and a lower circle of acanthus leaves derived from the Corinthian. This order admitted a great variety of ornamentation.

Orders in Council, orders issued by the English sovereign in accordance with the advice of the Privy Council, a body which has no legislative power, excepting so far as Parliament may grant it. In times of emergency, however, the Privy Council has issued orders of a legislative character. Those who were instrumental in issuing such orders or carried them out are generally relieved from all liability by a subsequent act of indemnity. It was by orders in council that Napoleon's famous Continental System was met. See CONTINENTAL SYSTEM; BERLIN DECREE.

Orders, Holy. See HOLY ORDERS.

Orders, Religious. The primary conception upon which the theory of the monastic life is based is an extremely old one, the belief that it was possible for man to perfect his moral nature and to attain the highest degree of spirituality by resorting to austere discipline and bodily mortification having been common among both Jews and Pagans long before the beginning of the Christian era. In fact, one has but to turn to the Essenes, the Stoics, or the Therapeutæ to find the germ of thought that was not only to inspire the asceticism of the early Christian times, but that was to grow and expand into the more purposeful religious orders of our own day; for the ascetics, with their macerations of the flesh, and the anchorites, or hermits, who retired from the world to strive to find spiritual strength in desert places, were the forceful influences in religious life, the examples of spiritual contemplation, without which the great monastic orders could scarcely have been instituted. The first ascetics as a rule did not separate themselves from the world, but sought to find the spiritual perfection to which they aspired by means of prayer and mortification of the flesh, not by withdrawing from the company of men; and even when, in the 3d century, the more zealous Christians were driven by persecution to find a place of refuge in the desert, they lived apart, in separate cells, such an idea as that of a common life or community of interests being entirely foreign to their purpose. It was Saint Anthony who first gathered a class of disciples about his feet that he might teach them, from his own wisdom and experience, how best to attain the spiritual heights upon which their longing eyes were set, and yet Saint Anthony formulated no hide-bound rule of life and announced no principles that would lead one to imagine that he had thought of uniting his individual disciples into a formal congregation. Saint Pachomius, who about 315 A.D. built his first monastery in the Thebaid, had only a vague idea of the value of the community life, and not the least conception of the possibilities for which he was so firmly laying the foundation, the religious orders of the Middle Ages that were at last to become such a powerful influence in the evangelistic work of the world. Although the rule of Saint Benedict was practically the only one that had been adopted at the beginning of the 10th century, the monasteries up to that time had been under the control of bishops. In the 10th century, however, several separate communities formed themselves into congregations under the direction of a common superior, and it was then only that the word "order" could be properly applied to any of the monastic institutions. This rule of Saint Benedict, which remained the popular monastic rule for centuries, provided a year's probation for novices, and bound each member after that period to constant residence within the monastery, unconditional surrender to the superior, canonical prayer, regular labor, and lives of chastity and complete renunciation of the pleasures of the world. The rule of Saint Augustine, another formular for the religious life which was quite widely adopted during the early centuries, was at first intended exclusively for the clergy and was not adapted for the use of the monks, who were then reckoned among the laity. It was not until the 8th century, therefore, when monks came to be regarded as entitled to clerical rank, that it was assumed by other than the regular clergy. The desire to give more austerity to the religious life, a movement which began to be noticeable in the 11th century, resulted in the establishment of several new orders. In almost each instance, while the rule of Saint Benedict was adopted, it was made more strict by special statutes, and to those who aspired to great asceticism life in these congregations appealed strongly. On the other hand, institutions like that of the Trinitarians, the Order of Grace, and others that mingled more freely with the world, were adopted by those who felt drawn to lives of action rather than to silent contemplation. To the mendicant orders, which appeared at about this time, many special immunities and privileges were given, and these were exercised everywhere without regard to parochial rights or jurisdictions.

From the beginning of the 10th century the multiplication of these religious associations of men bound together by vows to live devotional lives separated from the world, has been almost continuous. Local prescriptions, like the Reformation in England, Germany and other parts of Europe, the Revolution and the later "Law of Associations" in France, the attacks of the Liberals in Spain, and other forms of suppression have, from time to time, driven certain orders into extinction, but reorganization and rejuvenation, as well as the institution of new orders upon more modern rules of life, have tended to obliterate nearly all traces of the damage done by the passage and enforcement of such unfriendly statutes. The most numerous bodies of monks, of course, are those of the Roman Catholic Church. In the Eastern Church nearly all the orders follow the rule of Saint Basil, while the monastic orders in the Church of England or the Protestant Episcopal Church in the United States have either adapted old rules of living to their own use or have formulated rules suitable to themselves. In the Roman Catholic Church, however, monastic orders of men or women have been founded for almost every purpose.

The following is a list of male orders and congregations that have attained any great degree of prominence in the religious world:

ORDERS, RELIGIOUS

ORDERS OF MEN.

Alexian Brothers.—A pious society founded in the beginning of the 14th century by one who is simply known as "Tobias." The end of the order is two-fold: The sanctification of the Brothers, and the active exercise of charity toward the neighbor. (See CELLITES.)

Atonement, Society of the.—A religious order for the clergy and laymen of the Protestant Episcopal Church. Its objects are educational and charitable.

Antonines.—An order of monks founded by Gaston, a gentleman of Dauphine, in the 11th century, for the purpose of serving those who were attacked by a mysterious disease known as Saint Anthony's fire. The order, the members of which lived under the rule of Saint Austin, flourished until the Revolution.

Augustinians.—An order founded in Africa, in the 4th century, by Saint Augustine. It is devoted chiefly to intellectual and missionary works in America and Asia. In 1256 the various brotherhoods were united by Pope Alexander IV. (See AUGUSTINIANS.)

Baccanarists, or *Regular Clerks of the Faith of Jesus.*—A congregation founded by Baccanari, a native of the Trentino, at the end of the 18th century, for the purpose of reviving the suppressed Society of Jesus under another name. In addition to wearing the Jesuit habit and making the Jesuit vows, the members added a fourth vow of unconditional obedience to the Pope. In 1814, the Jesuits having been restored, the new order was absorbed into the Society of Jesus.

Barefooted Friars. (See TRINITARIANS.)

Barnabites, or *Regular Clerks of the Congregation of Saint Paul.*—An order founded in 1533, by Saint Antonio Maria Zaccaria, for the purpose of combating the evil tendencies of the age by the organization of a congregation of secular clergy who should not retire from the world, but who should live in it and work for it, and diligently attend to their own sanctification while preaching reformation to others. Besides the usual three vows, its members took a fourth: Never to seek office or ecclesiastical dignity, nor to accept any post outside of their order, without the permission of the Pope. With headquarters at Rome it has colleges in various parts of Europe.

Bartholomites.—A religious order suppressed by Pope Innocent X., in 1650.

Basilians.—An order taking its name from Saint Basil, bishop of Cæsarea in Cappadocia. (See BASILIANS.)

Beghards.—An association of laymen living together without perpetual vows. Organized in the 13th century they existed until 1650, when they were suppressed by Pope Innocent X.

Benedictines.—An order established at Subiaco, in the 6th century, by Saint Benedict, the patriarch of monks in the West. (See BENEDICTINES.)

Bernardines, or *White Monks.*—A particularly strict order of Cistercians instituted by Saint Bernard of Clairvaux, about 1115.

Bethlehemites.—An order established by Peter of Betancourt at Guatemala, in the 17th century. Its purpose is to attend the sick and teach in the schools of which it now possesses some 40, including hospitals, convents, and educational institutions. In 1867 Pope Innocent XI. placed them under the rule of Saint Augustine.

Black Friars. (See DOMINICANS.)

Blessed Sacrament, Congregation of the.—Founded by Pierre Julien Eymard, in 1856, as an effort to accentuate the honor paid to the Holy Eucharist, by the perpetual exposition and adoration of the Sacrament. The order has extended to all parts of the world.

Boni Homines.—Several monastic orders have borne this name: (1) An order founded by Saint Stephen Grandmont; (2) The Minims in France; (3) A Portuguese Order of Canons, founded by John Vicenza, Bishop of Lamergo, in the 15th century; (4) An order bearing this appellation existed in London in the 13th century.

Brigittines, or *The Order of the Saviour.*—Founded by Saint Bridget, about 1344, upon a constitution said to have been communicated by divine revelation. Its rule was that of Saint Austin. It is still represented throughout the European countries.

Cæsarians.—The adherent of Cæsar of Spires, a German friar of the order of Saint Francis who made himself conspicuous by opposing the attempt to relax the rules of the order. After 1256, however, when Saint Bonaventure became general, there was no excuse for the existence of the Cæsarian faction, and it died a natural death.

Camaldoli.—An austere order founded by Saint Romuald, in 1012. Its members, who wore a white habit, were obliged to fast during two Lents in the year; at other times to abstain from meat, and to live, at least three days in the week, on bread and water. In 1102, Rudolph, the fourth general, prepared the first constitution of the order, slightly mitigating the severity of the original rule. Although practically unknown in other countries it still exists in Italy.

Calvarines.—The Congregation of Calvarines, which was founded by Hubert Charpentier, a priest of the diocese of Auch, in 1635, ceased to exist during the Revolution. Its purpose was to honor the Passion of Jesus Christ and to labor for the promotion of Catholicism.

Capuchins.—The shape of a cowl was the bone of contention that at one time threatened the stability of the Franciscan order and that finally resulted in the institution of the order of Capuchins. The reformer was Matteo di Bassi of Urbino, an Observantine friar, who, becoming convinced that the cowl worn by the friars of that day was not the cowl prescribed by Saint Francis, not only adopted a *capuche* of different shape, but, in 1526, obtained permission of Pope Clement VII. for himself and his companions to wear this habit and also to adopt the life of hermits, preaching the gospel in all lands, under the provision that they should present themselves annually at a general chapter of the Observantines. Matteo began his preaching, and was so successful in arousing public interest that the provincial of his order had him arrested for apostasy. He was released from prison through the intervention of relatives of the Pope, and, shortly afterward (1528) a bull was obtained which authorized the union between the reformers and the Conventual branch of the Franciscans, allowed them to adopt the hermit life, sanctioned the wearing of beards, and permitted the use of the long-pointed cowl. From that day the growth of the order was rapid. Although still subject to the Conventuals, and under the rule of a vicar-general, the order in 1859 adopted separate statutes in which all the hours for religious service, for mental prayer, for silence, for taking the discipline, etc., were clearly prescribed. It was also stipulated that the order should have no revenues, but should live by begging, and everything about its churches and convents should be as poor and mean as possible. As to food, the friars were permitted to eat one kind of meat a day and wine was not forbidden, but it was specified that nothing should be said to discourage any member who might desire to diet himself more rigorously. Under this rule the order has produced many men eminent for their eloquence, their learning, or their Christian virtue, one of the most illustrious being Saint Fidelis of Sigmaringen, who was martyred in 1622. Strangely enough, however, the founder Matteo resigned from the order because the Pope had decreed that Capuchins who did not remain in their monasteries should not be permitted to wear the long cowl. In 1617 the Capuchins were made exempt from obedience to the Conventuals, and, under its present title, the order withstood the Revolution and other similar movements, and is widely represented to-day.

Carmelites.—Founded in the middle of the 12th century by a crusader named Berthold who vowed to embrace the religious life if God would make his side victorious in battle. (See CARMELITES.)

Carthusians.—The order of Carthusians was founded in the 11th century by Saint Bruno of Cologne, who resigned his position as scholasticus of the episcopal school of Rheims in order that he might retire from the world. The foundation of the new order was erected at Chartreuse, an upland valley, in the Alps, more than 4,000 feet above the sea. Although almost unapproachable, being surrounded on all sides by high crags, and while the soil was poor, the temperature low and the air charged with fog at almost all times, the site was gladly accepted, and here Bruno and his companions built their mother house, after the form adopted by the ancient Lauras of Palestine. In 1089 Bruno was summoned to Rome by Pope Urban II., who had been one of his pupils, and he never returned to Chartreuse, spending the remainder of his life in founding convents and promoting the interests of his order. Although it was many years before any statutes were framed for the Carthusians, and while the complete code was not arranged and approved by the Holy See until the latter part of the 17th century, the writings of Peter the Venerable, abbot of Cluny, prove that their life was one of great austerity even without a written rule. "Their dress," he says, "is meaner and poorer than that of other monks; so short and scanty and so rough, that the very sight affrights one. They wear coarse hair shirts next their skin and fast almost perpetually. Their constant occupation is praying, reading, and manual labor, which consists chiefly in transcribing books. "In spite of this rule, a rule so strict that the Church permits members of other mendicant orders to exchange their vows for those of the Carthusians while the Carthusian can pass to no other order, the success of its members in their search for the perfect life has been marked by great success." Since 1508, in accordance with the decree of Pope Ju-

lius II., the Carthusian monasteries in every part of the world have been under obedience to the prior of the Grand Chartreuse and the chapter-general of the order.

Celestinian Hermits.— An austere branch of the Franciscans that ceased to exist early in the 14th century.

Celestinians.— Before the elevation of Celestine V. to the pontificate, 1294, and when he was known merely as Peter of Morone, he founded an austere order which afterward took his pontifical title as its name. In spite of its strict rule of life, which provided for perpetual abstinence from meat and frequent fasting, the membership increased rapidly, and the order, which extended into almost every part of Europe except England, enjoyed great prosperity until it was suppressed, in Germany by the Reformation, and in France by the revolutionary commission of 1766. At present the order exists only in Italy.

Charity, Brothers of.— The congregation of the Brothers of Charity, of Saint Vincent de Paul, was founded in Belgium, about 1809, by Rev. I. Triest, canon of Saint Bavon, Ghent. Founded for the purpose of procuring the sanctification of its members by the practice of the three simple vows and the observation of its constitution, its special object is the ministry of charity. This ministry, which the congregation exercises in its several establishments, consists chiefly in maintaining and ministering to the aged, the sick and the insane; in sheltering poor workingmen; in educating children of all classes, but principally the poor, the orphan, juvenile offenders, and the deaf, dumb, and blind, and by performing any other work of charity to which they may be called.

Charity, Fathers of the Institute of. (See ROSMINIANS.)

Chartreux. (See CARTHUSIANS.)

Christian Instruction, Brothers of the.— This institute, which has for its purpose the Christian education and instruction of youth, was founded at Saint Brieuc, France, by Abbé John Mary de la Mennais. In 1891 it was approved by the Holy See.

Christian Brothers. (See BROTHERS OF THE CHRISTIAN SCHOOLS.)

Christian Brothers, Irish.— A religious congregation founded at Waterford, Ireland, in 1802, by Edmond Ignatius Rice, for the purpose of improving the education of the poor who were unable, under the penal laws, to procure Catholic education. The rules and system adopted were those of the institute founded by De la Salle, and the first school was opened at Mount Sion, in Waterford, 1 May 1804. The success of this venture was so great that similar establishments were opened in Dublin, Limerick, and other cities, and the results were so satisfactory that on 5 Sept. 1820, Pope Pius VII., acting upon the memorial of the bishops of Ireland, confirmed the institute and granted it a constitution. At the time of the establishment of the system of national education, in 1831, the Brothers placed their schools under the direction of the Board, but when it was found that its rules regarding the absolute separation of secular and religious teaching were tending to lead them from the spirit under which they had been founded, they withdrew their connection with the Government and have since conducted their schools as an independent institute under the protection of the Church. The Brothers are bound by the usual religious vows and are under the direction of a superior-general.

Christian Schools, Brothers of the.—An educational institute founded by Abbé J. B. de la Salle in the 17th century. (See BROTHERS OF THE CHRISTIAN SCHOOLS.)

Christian Doctrine, Fathers of the Congregation of.—The Congregation of the Christian Doctrine is the outgrowth of a society which was founded by Marco Cusani for the purpose of adopting more systematic methods in the teaching of the doctrines of the Church. When organized in 1560, the membership was composed of a number of priests and laymen who confined their efforts to teaching the catechism to children on Sundays and to the ignorant peasantry on Church holidays and such other times as it was possible to reach them, but the influence of the association was so strongly for good that it attracted the attention and approbation of Saint Pius V. Both Clement VIII., in 1596, and Urban VIII., in 1627, made the confraternity the object of their favor, the latter issuing an order providing that members leaving the community should incur the penalty of apostasy, as if monks. Pope Paul V. made the society an archconfraternity, and as such it remained until modern times, when it assumed the title of Congregation.

Cistercians.—The order of Citeaux, founded in 1098 by Saint Robert as an offshoot from the Benedictines, eventually became one of the most flourishing and illustrious of all the orders of the Church, but is now so nearly extinct that but few traces remain, the storms of the Reformation and Revolution leaving few of its convents in Europe. The order was founded in 1098 in the desert at Citeaux, near Dijon, by Saint Robert, who had gathered some twenty zealous hermits about him. Together they entered upon a most austere rule of life, for never was the rule of Saint Benedict followed more rigorously. There was fasting from 14 September until Easter, little sleep and much hard labor, with prayer and religious contemplation as the only relaxation. This was Saint Robert's ideal of the religious life, but he was not permitted to follow it for long, being commanded by the Pope to return to Molesme, his former charge. He obeyed the order promptly, leaving Alberic as his successor at Citeaux, and it was he who drew up the first statutes of the order, and who changed the color of the habit from brown to white. During more modern times there have been several reforms of the order, the most celebrated being that which was instituted at La Trappe. (See TRAPPISTS.)

Cluny, Congregation of.—The Congregation of Cluny is another offshoot from the Benedictine order which attained influence and greatness during the Middle Ages only to meet with extinction later. Founded in 912 by Saint Benno, abbot of Gigny, the order soon attained great wealth and political influence, the succession of great and saintly men who were associated with its work being sufficient to make its reputation widespread. Among these were Saint Mayeul, Saint Odilo, Saint Hugh, Pope Urban II., who preached the first crusade, Peter the Venerable, and many others.

Common Life, Clerks and Brothers of the.—An institute founded by Gerhard Groot, a deacon of Deventer, in 1384, for the purpose of providing a home for men who desired to live an austere Christian life in common without taking perpetual vows. The influence of the first house, instituted at Deventer, was quickly recognized by church authorities, and other houses were founded throughout the Netherlands and in Germany, and it was from these institutions that many good and wise men went forth to preach and teach, Thomas à Kempis and Nicholas of Cusa being among the number.

Conventuals. (See FRANCISCANS.)

Cordeliers. (See FRANCISCANS.)

Crutched Friars.—The Crutched or Crossed Friars are sometimes regarded as a branch of the Trinitarian stock, but by others it is claimed that they were a separate order founded by a prior of Saint Mary's, at Bologna, about the middle of the 12th century.

Discalced Trinitarians. (See TRINITARIANS.)

Divine Word.—The Society of the Divine Word was founded by Rev. Arnoldeus Janssen in 1875. Its object is the promotion of missionary work among the heathen and the education of youth of all races.

Dominicans, or Order of Preachers.— An order founded in the 13th century by Saint Dominic. (See DOMINICANS.)

Eudists.— A congregation of secular priests founded by Père Eudes of Normandy, in 1601. Established under the names of Jesus and Mary, the congregation had for its object the training of the clergy and the giving of missions. The Eudists make no vows and wear the ordinary dress of the secular clergy.

Eustathians.— A congregation of fanatical monks suppressed by the Council of Gangra.

Feuillants. (See CISTERCIANS.)

Franciscans.—The order founded by Saint Francis of Assisi in the early part of the 13th century. (See FRANCISCANS.)

Fratricelli, or Little Brethren.—Originally a strict branch of the Cistercian order it began to assume sectarian characteristics, for which it was condemned by papal bull in 1317. It somewhat resembled the Brethren of the Free Spirit.

Friars Minor. (See STRICT OBSERVANCE.)

Gilbertine. (See SEMPRINGHAM.)

Grandmontines.—A monastic order established in Limousin, France, by Stephen, a gentleman of Auvergne, about 1076. Now extinct.

Grey Friars. (See FRANCISCANS.)

Holy Cross, Congregation of the.—The Congregation of the Holy Cross was founded in Le Mans, France, 1793, by Rev. James F. Dujarie. Its object was the rehabilitation of the Christian schools then almost destroyed by the Revolution. At first it was composed only of Brothers, but, in 1837, candidates for the priesthood were admitted under the Reverend B. Moreau, who became the first superior-general. The Congregation received the approval of the Holy See 13 May 1857, as a religious society of priests and brothers, devoting their lives to educational work in universities, colleges, and schools, and missionary work at home and in foreign countries. The Congregation was introduced into the United States in 1841 when the Reverend E. Sorin, afterward to become the head of the society throughout the world, established a college in the primeval forest of northern Indiana and called the place Notre Dame. From this humble beginning grew the University of Notre Dame, one of the largest and most

advanced Roman Catholic educational institutions in America. The original band of 11 has developed into a community of 275 priests and brothers, conducting colleges in various parts of the United States and Canada. Its members also have charge of large missions in India, and the Congregation is noted for its progressive spirit and the zealous work and scholarly attainments of its members.

Holy Cross of Westminster, Order of the.—A religious order for priests and laymen of the Protestant Episcopal Church. It was founded in New York city in 1881, but was removed to Westminster, Md., in 1892. Its objects are the cultivation of the spiritual life of its members, and the performance of good works, especially those connected with missions, retreats, etc.

Holy Ghost, Congregation of the.—The Congregation of the Holy Ghost, otherwise known as the Missioners of the Immaculate Heart of Mary, is the result of the union, in 1848, of these two societies. The Congregation of the Holy Ghost had been founded in Paris in 1703, by Claude Desplaces, a Breton, while the Missioners were organized by Francis M. P. Liebermann, about 1841. Finding that the two organizations were working along practically similar lines, it was decided to effect a fusion, the rule of the Fathers of the Holy Ghost, which had already been confirmed at Rome, being retained, while the constitution adopted should be that of the Missioners. Its objects remained the same: The perfection of its members and the evangelization of the blacks, especially the negroes of Africa. Since 1848 many educational institutions have been founded, and all have been conducted with skill and ability, the most important being the French Seminary at Rome. The society is governed by a superior-general elected for life, while the missions are conducted under the direction of bishops or vicars-apostolic chosen from the general body. Members take the three ordinary vows of religion, and bind themselves to the Congregation, first temporarily, but afterward perpetually.

Holy Infancy, Brothers of the.—The Brothers of the Holy Infancy consecrate themselves to the care of children, the education of the young and the reformation of juvenile criminals. They direct a Roman Catholic Protectory at West Seneca, N. Y.

Holy Saviour, Companions of the.—A congregation in the Protestant Episcopal Church established for clergymen and such laymen as may be preparing for holy orders. Its members pledge themselves that, while in the congregation, they will keep a simple rule of prayer, meditation and study in divine things.

Immaculate Conception, Regular Canons of the.— Its object is the education of the clergy for parish work as well as the education of seminarians, and yet with many houses in Europe and 16 in Canada, the institute is not represented in the United States.

Jeronymites.— During the Middle Ages a number of men followed the example of Saint Jerome, who spent four years in solitude in the Syrian desert. They were known as the Hermits of Saint Jerome, or Jeronymites, and, of these four distinct congregations are mentioned by monastic historians: (1) The Disciples of the Blessed Thomas of Sienna; (2) The Hermits of the Observance; (3) the Hermits of the Blessed Peter of Pisa, and (4) the Hermits of Fiesole. No Jeronymite convents exist at the present day.

Jesuats.—A congregation founded as a lay order by Saint John Colombini, in 1376, who, upon being converted by reading the life of Saint Mary of Egypt, turned his house into a hospital and adopted a life of continence, humbling himself to the condition of the poorest among whom he preached and worked. Urban V. confirmed them and gave them their habit, white, with white hood, a large brown mantle and wooden shoes. The order prospered for nearly three centuries; but, in 1668, Pope Clement IX. suppressed it because certain of their practices did not meet with approval.

Jesuits, or *Society of Jesus.*—An order founded by Saint Ignatius Loyola in the early part of the 16th century. (See JESUITS.)

Lazarists.— The Congregation of the Priests of the Mission, founded in 1624 by Saint Vincent de Paul, have always been popularly known as Lazarists, probably because of the fact that they were early located at the College of Saint Lazare in Paris. The institution was founded for the direct purpose of preaching missions in country districts in order that the peasantry might be awakened to the danger of making bad confessions, but the avowed object of its members as specified in its constitution, confirmed by Urban VIII., in 1632, is (1) the sanctification of its own members, (2) the work of preaching missions, and (3) the training of an exemplary clergy. At the present time the Congregation has houses in almost every part of the world, many Asiatic missions having been placed in their charge at the suppression of the Jesuits, in 1773.

La Salette, Missionary Fathers of.— A congregation founded at the shrine of Our Lady of La Salette, by Philibert de Bruillard, bishop of Grenoble, in 1852, in commemoration of the apparition which had made the shrine so famous (19 Sept. 1846). The purpose of the congregation is based upon the teachings of "Our Lady in her Apparition," and is (1) to labor for the conversion of sinners by the preaching of missions and retreats, and (2) to devote special attention to combating the crimes of the age that were "recalled by the sorrowful voice of the Mother of God at La Salette."

Marist Brothers, or *Little Brothers of Mary.*— An order founded at Lavalle, France, in 1817, by the Venerable Joseph Benoit Marcelin Champagnat. The object is the education of youth.

Marist Fathers.— The Marists, otherwise known as the Society of Mary, is a religious order founded, about 1816, by Very Rev. Father Colin, who desired to establish an association which should unite the work of education with that of preaching missions. In 1818 Pope Pius VII. expressed his approval of the project, and, thus encouraged, Father Colin proceeded with his work of organization. From the beginning the Society has devoted itself to the foreign missionary field. In 1836, the Congregation of the Propaganda entrusted the organization with the work of spreading the faith in Western Oceania, and while no Catholic priest had ever visited the islands, the Marist Fathers penetrated even to the most savage tribes and everywhere succeeded in making converts to Christianity. Many missionaries were martyred by the cannibals, but, never discouraged, the Fathers returned to the work of civilization and salvation. The order is now represented in nearly every part of the world.

Mary of Paris, Society of.— Founded for the purpose of educational and missionary work, the society is extensively represented in all countries. The members are also known as "Brothers of Mary."

Maurists.— The popular name for the members of the Congregation of Saint Maur, that offshoot from the Benedictine order which became so famous during the 18th century, especially for its literary achievements. Founded, in 1618, by Dom Benard, as a more austere branch of Benedictines, it immediately received the support of high ecclesiastical authorities, and its influence extended throughout the country. While its early history was marked by its fervor for the religious life, its later record was not so brilliant. Infected by Jansenism; overrun by a demand for a relaxation of almost every rule, tainted by the pseudo-philosophic spirit of the age, and, in some places, even by Freemasonry, the dissensions which were awakened by the opposing factions would have been sufficient to have wrecked the order ultimately even if the suppression of 1792 had not come to put an end to its existence.

Mechitarists.— A congregation founded by Mechitar, an Armenian youth of an ancient Catholic family, in the early part of the 18th century. While a firm adherent of his Church, his love for his nation was so great that he determined to devote his life to the instruction and improvement of his people. From the time of his ordination as priest, in 1699, it was his ambition to found a convent from which his educational work might be conducted; but while he made several unsuccessful efforts, it was not until about 1717, when he obtained the right to the island of San Lazzaro, from the government of Venice, that he was able to see his hopes realized. There he founded the great Armenian convent from which the works of the Mechitarist presses go forth to all parts of the world in which there are Armenians to read them.

Mercy, Fathers of.— An order founded in 1808 by Very Reverend Jean Baptiste Rauzon, vicar-general of Bordeaux, for the restoration of religion in France after the Revolution. At that time the Fathers were known as "Missionaires de France." In 1834 the society now called Fathers of Mercy was formed, its object being to give missions and retreats, to assist the parochial clergy in preaching, and to conduct colleges, seminaries, and other educational institutions.

Minims, or Paulanites.— Names popularly applied to the Minim-Hermits of Francis of Paola, an extremely austere order of friars founded by Saint Francis of Paola, about 1437. When a boy of 13 Saint Francis had shown such a desire to lead a religious life that he was sent to a Franciscan convent, but, while he displayed extraordinary piety and no little affection for the Franciscan rule, he withdrew from the convent, and, at the age of 19, was living the life of a hermit in a solitary place near his native town. Young as he was his piety was unquestioned, and he was finally prevailed upon to receive some disciples, with whom, in separate cells, he founded his first community. Although no written rule of life had been prepared the members of the new order observed a perpetual Lent from the first day of its inception, and the austerity of the rule was never relaxed.

Minorites. (See FRANCISCANS.)

Missions, Congregation of the. (See LAZARISTS.)

Most Precious Blood, Congregation of the.— The Congregation of the Most Precious Blood, otherwise known as Sanguinist Fathers, was founded in 1823 by the Venerable Caspar del Bufalo. The object of the new congregation was to counteract the evil effect that the French Revolution and the subsequent wars throughout Europe had had over the minds of the people. By preaching missions and giving retreats the Fathers called attention to the Precious Blood, and their efforts succeeded in arousing such a spirit of devotion that by 1840 the community had spread over the whole of Italy and into other parts of Europe. In 1843 the order reached the United States and established communities throughout the Middle and Western States.

Nazareth, Brothers of.— A religious order for laymen in the Protestant Episcopal Church. Founded in 1886, its objects are "prayer and manual work."

Oblates.— A congregation of secular priests who, as their name implies, "offer themselves" to perform any duty that a bishop may assign. The first institution of this character was founded in 1578, when Saint Charles Borromeo, archbishop of Milan, organized a band of zealous priests as the congregation of "Oblates of the Blessed Virgin of Saint Ambrose." The experiment proved so satisfactory that several other congregations have since been organized, conspicuous among which are the Oblates of Italy, an association founded in 1816 to assume control of the missions of Eastern Burma; the Oblates of Mary Immaculate, and the Oblates of the Sacred Heart.

Observantines. (See FRANCISCANS.)

Our Lady of Lourdes, Brothers of.— A congregation founded in 1830 by Very S. M. Glorieux, who desired to institute an order whose duty it should be to care for the orphan, to promote the Christian education of the young, especially in the case of the poor, and to nurse and care for the sick and aged. By a decree dated 18 July 1892 Pope Leo XIII. gave his full approbation to the order, which is widely represented both in this country and in Europe.

Our Lady of Mercy, Military Order of. (See TRINITARIANS.)

Passionists, or the *Discalced Clerks of the Most Holy Cross and Passion of our Lord Jesus Christ.*— An order founded by Saint Paul of the Cross, who assumed the habit of the order with the sanction of the bishop of Alessandria, in 1720. A year later, having formulated his rule of life, he went to Rome seeking permission to found his order. Although he was not looked upon with disfavor it was 1737 before the last obstacle was removed and the first monastery established. In 1746 the rules of the order were confirmed by Benedict XIV. and, shortly afterward, Clement XIV. favored the Fathers by conferring upon them the Church of Saints John and Paul, on the Cœlian Hill. From that day the congregation rapidly extended, first throughout Italy, and, afterward, into other parts of Europe, even obtaining a good foothold in England by 1842. Ten years later the order was introduced into the United States by Bishop O'Connor of Pittsburg. There are few orders that follow a more austere rule, for the Passionists fast three days in each week, as well as through Advent and Lent, and sleep little, rising to say all the offices in choir at the canonical hours. Their habit is simple, if not mean, nothing being worn on the feet but sandals, and all the time not given to the work of giving or preparing for missions or retreats is devoted to contemplation. Beside the three usual vows, members of this order take a fourth, that they will at all times do their utmost to keep the memory of the Lord's passion ever alive in the hearts of the faithful.

Paulists. (See PAULISTS.)

Piarists.— The regular clerks of the Scuole Pie, or religious schools, instituted at Rome during the 16th century.

Picpus.— There have been two congregations of Picpus, the first a reform of the Third Order of Saint Francis, which was instituted by Vincent Mussart in 1594; the second, a congregation founded by Pierre Coudrin, in the latter part of the 18th century. Having, like other seminaries, been dispersed by the French government, Coudrin formulated the plan for the organization of a congregation which should not only undertake to prepare candidates for the priesthood and the missionary field, but should protest against the infidelity of the times by maintaining a perpetual adoration of the Blessed Sacrament. So well did he plead his cause that he aroused the sympathies of high ecclesiastics, and, in 1805, he was able to open the first house of his congregation in the Faubourg Saint Antoine, Paris. By 1817, when the full approbation of the Holy See was obtained, the Fathers of Picpus were in control of several important educational institutions, and, in 1825, a company of the priests of the order were sent to the Pacific Islands by Leo XII., in the hope that they might convert the savage natives to Christianity. From that time most of their activity has been devoted to missionary endeavors, and the fact that their membership has included such men as Father Damien, whose work among the lepers will never be forgotten, explains the reason for their great success in the mission fields.

Preachers, Order of. (See DOMINICANS.)

Premonstratensians.— An order of regular canons founded by Saint Norbert at Premontre, near Laon, in 1119. The rule of the order is that of Saint Austin, its habit is white, whence its members have frequently been known as "White Canons." While its founder imposed perpetual fasting and an entire abstinence from meat as an inviolable rule, a gradual relaxation occurred, and from time to time the order was threatened first by one then by another of the several reform movements which were instituted. In spite of this it flourished and, at one time, there were more than a thousand Premonstratensian houses in various part of Europe. Then came the religious disturbances in England, the Reformation, and, finally, the Revolution, at the close of which only eight houses remained undisturbed. Since that time a few more houses have been opened, especially in England, but there is no comparison between the present almost impoverished institutions and the order which was once such a powerful influence in the religious life of Europe.

Recollects.— A branch of the Franciscan order which has been in existence for more than three centuries. Although originally (1597) the French branch of the reform movement led by the friars of the Strict Observance its members have guarded the austerity of their rule so zealously and have kept so free of any taint of Jansenism that many favors have been shown them, one being the order which placed them in charge of the convent at Jerusalem.

Redemptorists, or *Congregation of the Most Holy Redeemer.*— A congregation founded by Saint Alphonsus Maria de Liguori at Scala, in 1732, as the result of his experience in evangelistic work among the poor. Both in the great cities like Naples and in the rural districts which he had visited for the purpose of giving missions Alphonsus had found a moral and spiritual destitution which appealed to him as most pitiable, and it was his desire to institute an order of zealous men who should be willing to strive to copy the life of Jesus Christ in all things, especially in following His example of evangelistic work among the poor and needy, that led to the formation of this congregation. Beset by many obstacles and hindered by opposition from strong political sources Saint Alphonsus persisted in his work. One by one houses were founded in different parts of the Papal States, gradually they spread beyond the Alps, and when, in 1749, Pope Benedict XIV. approved its rule the Congregation was in a most prosperous condition. Originally called the Congregation of the Most Holy Saviour, the name was changed to that of the Most Holy Redeemer, by order of the Pope, but its rule remained unchanged. The members not only take the three simple vows but make a fourth, a vow of perseverance until death in the institute, and their vow of poverty binds them to refuse all dignities and offices that may be tendered them outside the Congregation. The chief occupation of the Redemptorists is the preaching of missions and retreats to persons of all classes, but especially to those who are most neglected by other clergy. In fact so anxious was the founder that the Congregation would pursue this principle, that he forbade its members to undertake any educational work that might distract their minds from the neglected poor to whom he desired them to devote their lives. The order, which still flourishes, is under the direction of a superior called the Rector Major who is elected for life.

Rosminians, or *Fathers of Charity.*— A congregation founded in 1828, by Antonio Rosmini, for the purpose of promoting works of charity of every sort, an aim which was fully realized, for during the first 10 years of its existence its members were engaged in preaching and teaching, in giving retreats, in visiting the sick, in missionary work at home and abroad, in caring for prisons and hospitals, in almsgiving and in general literary labors. During this period the order had extended to England and it is now represented by houses in almost every part of the world.

Sacred Heart, Brothers of the.— A congregation founded at Lyons, France, in 1820, by Père André Coindre, a member of the Society of Missions. The two objects of the institution are (1) self-sanctification by devotion to the Sacred Heart, and (2) the Christian education of youth in schools, asylums and colleges. In September 1900, at a general chapter held in France, two new provinces were established, one for the United States and the other for Canada. A novitiate house for the United States was opened at Metuchen, N. J., in June 1901, and this is now the official residence of the provincial of the order.

Saint Charles Borromeo, Congregation of the Missionaries of.— A congregation founded by Bishop Scalabrine at Piacenza, Italy, in 1887, its object being to provide missionaries to the Italian emigrants to North and South America. Although the scope of work and aim of the congregation is restricted to this field, the institution of the order met with the warmest approval of Pope Leo XIII., and his letter of 1888, addressed to the archbishops and bishops of America, in which the late Pontiff expressed his interest in the purpose of the new organization, has done much to further its work in this country.

Saint Francis Seraphicus, Poor Brothers of.— An institute founded 24 Dec. 1857 by Philip Hoever, principal of Saint Peter's parish school, Aix-la-Chapelle, Germany. Its object is the promotion of the Christian education of youth.

Saint Gabriel, Brothers of.— An institute founded in 1705 by the Blessed Louis Marie Grignon de Montfort. Its object is the education and Christian instruction of youth as well as the care of deaf, dumb, and blind institutions and orphan asylums.

Saint John of God, Order of.— The Order of Charity of Saint John of God was founded by the Saint at Granada, in 1350. Its object was to serve the sick, and this purpose was adhered to so zealously that it had more than 280 hospitals under its care when it was practically suppressed by the Jacobins in France and the Liberals in Spain. A few houses by the order still exist.

Saint John the Evangelist, Society of Mission Priests of.— Founded by several ritualistic clergymen of the Church of England, at Cowley, England, in 1865, the objects of this society are to assist its members in striving after Christian perfection and to work for the advancement of God's glory by conducting missions and retreats, and by such other methods as He may suggest. The first company of Fathers arrived in the United States in 1872, and they are now extremely influential, especially in high church circles.

Saint Joseph, Order of.— A title that has been borne by two communities: (1) the Order of Priests of the Mission of Saint Joseph, a congregation founded by Jacques Cretenet, at Lyons, in 1640. Its purpose was devotion to foreign missions. It was suppressed by the Revolution. The present bearer of the name is the Order of Saint Joseph, a teaching order founded at Grammont, Belgium, in 1817, by Canon Van Crombrugghe, its purpose being the improvement of the education given the children of persons of the commercial and industrial classes.

Saint Vanne, Congregation of.— The Congregation of Saint Vanne devoted its efforts to educational and especially to literary pursuits. Its houses were suppressed by the Revolution.

Saint Viateur, Clerics of.— The community of the Clerics of Saint Viateur was founded in 1835 by Very Rev. F. L. M. J. Querbes, pastor of Vouries, near Lyons. Its objects are educational.

Salesian Fathers.— The order of Salesians is a society of priests and lay brothers founded by Don Bosco, a priest of Turin, Italy, in 1864. In 1874 the order received the approval of Pope Pius IX. Its primary object is the rescuing of poor, homeless boys from the street, providing them with food and shelter in the institute of the society. There they receive a sound moral and religious education as well as practical instruction in some one of the arts, sciences, or branches of trade, according to their inclination or ability. The society is also engaged in other educational work.

Sanguinists. (See SANGUINISTS.)

Sempringham, Order of.— Founded by Gilbert, a priest of Sandringham, England, about 1135, it enjoyed considerable prosperity until the Dissolution when all its houses were suppressed. The rule followed was that of Saint Austin, modified by statutes of Gilbert's own making.

Servites.— The order of Servites, or of the Religious Servants of the Holy Virgin, was founded in 1233 by seven pious merchants of Florence. Becoming possessed of the idea that they had been admonished to renounce the world, they sold their property, distributed the money among the poor, and, taking up their abode in a small house, lived according to a rule of great austerity, supporting themselves by begging in the streets. In 1276 the order was threatened with suppression by Innocent V. on the ground that it came under the prohibition of the Council of Lyons against the multiplication of religious orders. Owing to the efforts of Saint Philip Benite, however, the Pontiff was persuaded to withhold a formal decree, and it was not many years before the order began to be the recipient of all kinds of pontifical favors, culminating, in 1487, in the "Mare Magnum" of Innocent III., which placed the Servites upon a plane of equality with the other four mendicant orders. Like other orders it suffered greatly during the Reformation and Revolution, but many of its houses have been rebuilt and there are now flourishing Servite establishments in many parts of the world.

Strict Observance, Friars of the.— An austere branch of the Franciscans established by Blessed John de Puebla, on the Sierra Morena, in Spain 1489. The branch, however, soon became a separate congregation and so remained until the various factions of the Observantines were reunited as "Friars Minor," by Pope Leo XIII., 4 Oct. 1897.

Sulpicians.— A society of priests founded in 1642 by Abbé Jean Jacques Olier at the seminary of Saint Sulpice in Paris. The members devote themselves to the direction of theological seminaries.

Theresians.— A name applied to those Discalced Carmelites who live under the reform rule of Saint Theresa.

Theatines.— A congregation founded by Saint Cajetan and three friends in 1524. Embracing a most austere rule, binding themselves not only to have no property but even to ask no alms, depending solely upon the providence of God for their support, their numbers increased until the time of the Revolution. Their houses are now found only in Italy.

Trappists.— A reform of the Cistercian order instituted in 1662 by Armand Jean le Bouthillier de Rance. Assuming control of the abbey of La Trappe, in 1660, he found it in a most deplorable condition. The Cistercian rule had been so far relaxed that many of the members had ceased to live in community, and de Rance devoted all his efforts to the restoration of regularity and order. Establishing what he called the "Strict Observance of the Cistercian Order," he succeeded in persuading some monks of the Strict Observance to come to his assistance, and together they completely restored the discipline of the monastery. From La Trappe this austere rule spread into other parts of Europe where it met with such instant favor that some of the most flourishing monastic houses in the world are now those of the Trappist reformers.

Trinitarians.— An order founded at Rome in 1198 by Saint John of Matha and Felix of Valois, an aged French hermit, its object being the release of Christians — many of whom were held captives by the Turks who, having retaken Jerusalem, were holding their prisoners in such cruel slavery that an organized effort for their relief seemed an imperative necessity. The order, therefore, received the sanction of Pope Innocent III., and a monastery was opened at Cerfroy, France. The rule adopted by the Trinitarian monks was that of Saint Austin, made more austere by the peculiar statutes that were original with the founders. Immediately after the foundation of the first monastery the work was commenced with great vigor, and at one time it was estimated that fully 31,000 Christian captives had been rescued through this agency. In 1218 the Military Order of Our Lady of Mercy, which had the same general purpose as that of the Trinitarians, was founded and later, when it had thrown off its military character and adjusted itself more closely to the rule of Saint Austin, it became almost identical with the older order. In 1599 a reform of the first order was instituted by Father Juan Baptista, under the name of Discalced Trinitarians. This reform was approved by the Holy See, but its houses, as well as houses of all other branches of the order, were suppressed by Queen Isabella II. of Spain.

Vincentian Friars. (See LAZARISTS.)

White Friars. (See CARMELITES.)

Xaverian Brothers.— A teaching institute founded at Bruges, Belgium, by Theodore James Ryken, in 1846. The purpose of the founder was to organize "a congregation of men who would willingly sacrifice their lives to the Christian education of youth," an object which has been adhered to so closely that the order has long been regarded as one of the most successful teaching institutes of the Church.

ORATORIES.

The Oratory, which has been such an important factor in the evangelistic work of the Roman Catholic Church, especially in England, had its inception in the mind of Saint Philip Neri, a native of Florence in the 16th century. Always conspicuous for the purity of his life and the desire to do good for young men, he early gathered about him a number of sympathetic souls who were ready to follow his guidance in order that they might lead a life of greater religious regularity. Although still a layman he preached to them in private, teaching them how to show more zeal for God without retiring from the world. In 1551, upon the advice of his confessor, Philip received holy orders, but even then he continued to receive his congregation in private, either in his own room or in a larger chamber, and it was from these daily colloquies that he evolved the system of evening exercises which has always been maintained by his Congregation. This consists of a popular devo-

tional exercise, a few hymns and a plain sermon preached, somewhat conversationally, directly at the hearts of the people. These exercises, which were held on every week-day evening except Saturday, became so popular that, in 1558, he obtained permission to build a chapel in the Church of Saint Jerome. He called it an "oratory," and it was from this that his Congregation obtained its name. It was at about this time that Philip's work attracted the attention of some of the most zealous churchmen in Europe, and so many of them joined him that, in 1564, he felt justified in assuming charge of the Church of Saint John the Baptist which had just been completed at Rome. In 1575 the Congregation had so increased in numbers that it was deemed necessary that they should have an establishment of their own, and, the old church of the Vallicelli being ceded to them, Philip began the erection of the present edifice, called the "Chiesa Nuova," on the old site. At its completion he rejoined his Congregation, the constitution of which had already been approved by Pope Gregory XIII., and remained in Rome until his death, in 1595. The conception which was the basis upon which Saint Philip founded his Congregation was that there were people in the world who were not in sympathy with the work of the monastic orders but who might be reached if sought in another way. He proposed, therefore, that his Congregation should be composed of simple priests. They should take no vows, and while they should be bound by a certain rule of life while associated with the community, they might withdraw without reproach at any time. To his followers he taught his methods, imbuing them so zealously with the spirit of his work that it is still conducted as if he himself were present to direct it. Instead of taking a combative position he assumed one of tranquillity. Instead of going out in search of sinners he sat in his own room and let them come to him. He abhorred all that savored of the systematic; he made few attempts at the exposition of doctrine, and he avoided the catechetical schools. Instead he accepted the inevitable, the conditions which he knew he could not change, and simply tried, as Cardinal Newman said, "to sweeten and sanctify what God had made very good and man had spoilt." With unaffected humility and love he gathered "his family" around him, and they, convinced by the eloquence of his personal character, took up his work and followed him. For nearly three centuries the work of the Oratory was confined to Italy, but, in 1847, Dr. Newman introduced it into England. The first house was instituted at Mary Vale, or Old Oscott, but, in January 1849, it was transferred to Alcaster Street, Birmingham. A few months later Father Frederick Faber, one of the most eloquent men the Oratory has ever produced, opened another house at King William Street, Strand, London, where, assisted by several of the priests from Birmingham, he soon gathered a large congregation of listeners. For about a year the London house was in affiliation and under the direction of the house at Birmingham, but as such a system was not entirely in keeping with the spirit of the constitution, which provided that each house should be independent, the London Oratory was released from its obedience to the older oratory in 1850, and, shortly afterward, it was transferred to Brompton, from which place it has exerted a wide influence over Catholic thought in England. During the history of the Roman Catholic Church other congregations have adopted the title of "The Oratory." In 1611 Cardinal de Berull of Paris organized a society of priests under this name, which, in 1614, was changed, by Pope Paul V., to "The Congregation of the Oratory of Our Lord Jesus Christ in France." Like the Italian Oratory of Saint Philip, the members of the French society were simple priests. As Bossuet says, its founder "preferred to give no other spirit to his company but the spirit of the Church itself, no other rule than her canons, no other superiors than her bishops, no other bond but charity, and no vows but those of baptism and ordination." The object of this organization was chiefly to promote the spirit of devotion among the secular clergy, a work which was partly conducted by the institution of seminaries for the education of candidates for the priesthood. At the death of the founder, in 1629, the congregation was represented by more than 50 seminaries, colleges and houses of retreat, while it was generally admitted that the society had been the means of deepening the ecclesiastical devotion and strengthening its discipline, an influence which was already making itself apparent throughout the entire population. After the death of the Cardinal the work was continued under the direction of Père de Condren, who was followed by other good men and strong leaders, and while for a time its usefulness as a church organization was threatened by the influence of Jansenism, which found many converts among its members, the orthodox section finally proved the stronger, and the bull was accepted by the vote of the congregation in 1746. When other orders were immediately suppressed by the Revolution the Congregation's valuable work in the cause of education saved it for a time and it might have passed through those troublous times without molestation if the Fathers themselves had not resisted the authorities by refusing to be present at certain services appointed to be held in their own church. Later a few of the members took the oath required, but the congregation never regained its influence. In 1852 a congregation known as the "Oratory of the Immaculate Conception" was instituted at Paris by the Abbé Gratry and M. Petetot, cure of Saint Roch. Later this organization adopted the rule of the French Oratory.

ORDERS OF WOMEN.

The following is a list of the most prominent orders of women that have been or are now in existence in the Roman Catholic and Protestant Episcopal churches:

All Angels, Community of.— A sisterhood in the Protestant Episcopal Church. Founded by the Bishop of Delaware and incorporated in 1895, its members are engaged in all kinds of educational and charitable work including the care of a day nursery and orphanage for factory children. The order is under the direction of the Bishop of Alabama.

All Saints' Sisters of the Poor.— An order established in the Church of England in 1851 by Rev. W. Upton Richards, and introduced into the United States by the Bishop of Maryland in 1890. Its members have undertaken all kinds of charitable and educational works, ranging from fashionable boarding schools for young ladies to day mission schools for colored children.

Angelicals.— An order of nuns, followers of the rule of Saint Augustine, founded by the Countess of Guastalla, in 1530.

Annunciation of the Blessed Virgin Mary, Sisters of.— A society incorporated in 1893 to receive and care for incurable and crippled girls between the ages of 4 and 16 years.

Apostoline Sisters.— An order founded at Loda, Ill., 15 Aug. 1884, by Rev. Louis Heidemann. Its object is the education of youth.

Assumption, Sisters of the.— An order founded by Monsignor Affre, archbishop of Paris, in 1839. It is chiefly an educational order. The Little Sisters of the Assumption nurse the sick poor in their own homes night and day; caring for the children and the house in order that the home may not be broken up during the illness of some of its members. For these services they accept no pay, not even food.

Atonement, Sisters of the Society of.— An Episcopal order for women in affiliation with the order of the same name for men.

Basilian Nuns.— The Basilian nuns were founded by Saint Macrina, but nearly all afterward became affiliated with the Eastern Church.

Beguine Nuns.— The female branch of the Beguine order of monks.

Bethany, Sisters of.— An order founded in New Orleans, La., and now under the pastoral care of the Episcopal bishop of that diocese. Its object is the care of neglected children.

Bon Secours, Sisters of.— Instituted by Mgr. de Quelen, archbishop of Paris, 1822, for the purpose of caring for the sick in their homes and for the orphans in asylums provided for them. The Sisters of Notre Dame de Bon Secours, founded in 1840, by Rev. Paul Sebastian Millet of Troyes, France, has practically the same object.

Blessed Sacrament Sisterhoods.— The orders of Blessed Sacrament nuns are of recent origin. Those of the Perpetual Adoration, as their name implies, devote their constant attention upon the devotions to the Holy Eucharist. The Sisters of the Blessed Sacrament for Indians and Colored People is an American order, founded in 1889, by Mother Mary Katherine. Its purpose is the elevation, education and christianization of the two races.

Blessed Virgin Mary, Institute of.— One of the few Roman Catholic orders of English origin instituted since the Reformation, it was founded by Mary Ward, the daughter of a gentleman of large estate, in 1611. A teaching order of the highest class, it prospered from the first, and it is still a flourishing religious institute, being popularly known as "the Institute of the English Virgins." The rule of the order has always been practically the same as that of the Society of Jesus.

Brigittines.— The order founded by Saint Bridget of Sweden in 1344 was instituted both for men and women, each monastery being double.

Calvarian Nuns.— There have been two congregations of Calvarian nuns, both of which still flourish. One was founded at Poitiers, by Père Joseph, a Capuchin, in 1617; the other, which has for its purpose the education and support of destitute and home

less girls, was instituted at Genoa, in 1619, by Virginia Braccelli.

Camaldoli.— The female branch of the austere order of the Camaldoli.

Charity, Sisters of.— There are many orders and branches of orders in the Roman Catholic Church which bear the name of Sisters of Charity. Some of them are also called "Gray Sisters," or "Gray Nuns," "Daughters of Charity," "Sisters of Saint Vincent de Paul," etc. The oldest order was founded in Paris in 1634, by Saint Vincent de Paul, assisted by Mlle. Louise le Gras, and its constitution has never been changed. Instead of making perpetual vows the Sisters take the simple vows, which are renewed annually, when they also add a fourth vow, binding themselves to care for the sick. The order of Sisters of Charity in the United States was founded by Mother Seton, who, after her conversion to the Roman Catholic faith, devoted her life to the charitable works of the Church. Her first community, which was known as the Sisters of Charity of Saint Joseph, was established at Emmitsburg, Md., 31 July 1809. The Sisters of Charity of Cincinnati, Ohio, are a branch of the order founded by Mother Seton. The Sisters of Charity of Saint Paul are a congregation largely devoted to teaching. It was founded in 1704 by M. Chauvet, a French curé, assisted by Mlle. de Tylly. The Sisters of Charity (Irish) are an order which is very similar in purpose to that founded by Saint Vincent de Paul. Its members minister to the sick and poor in hospitals and at their own homes. It was founded in 1815 by Mrs. Mary Francis Aikenhead. The congregation of Sisters of Charity of the Blessed Virgin Mary devote themselves exclusively to the education of youth. The order was founded in Philadelphia, Pa., by Very Rev. Terence James Donoghoe, assisted by Mother Mary Francis Clarke, its first superior-general, on 1 Nov. 1833. The Sisters of Christian Charity devote themselves to educational work and to the care of poor and orphaned children. The Sisters of Charity of Nazareth are an American community founded in 1812. Its members devote themselves to educational and charitable works. The Sisters of Charity of Our Lady Mother of Mercy, are a congregation founded by the Most Rev. John Zwyzen, archbishop of Utrecht, in 1832. Its purpose is the education of youth, as well as the care of the sick, aged and orphaned. The latest work undertaken by these Sisters is the care of the lepers at Paramaribo, Dutch Guiana. The order of Sisters of Charity of Providence was founded in Montreal 25 March 1843. Its work is educational and charitable, including the care of hospitals. The Sisters of Charity, Servants of the Poor; Sisters of Charity of the Cross (Gray Nuns); the Sisters of Charity of the General Hospital of Montreal, and the Sisters of Charity of the Hospital of Saint Hyacinthe, are Canadian orders devoted to the care and education of the sick and poor.

Cistercians.— The female branch of the order of Cistercian monks.

Cluny.— The female branch of the Congregation of Cluny.

Carmelites.— The female branch of the order of Carmelite monks, reformed by Saint Theresa in 1562.

Cross, Daughters of the.— A congregation founded by Saint Francis de Sales, whose rule it still follows. Its work is strictly educational. In addition to their educational work the Gray Nuns of the Cross care for the sick, the orphan, and the aged.

Discalced Carmelites. (See CARMELITES.)

Divine Compassion, Sisters of the.— A congregation founded in 1873, by Rt. Rev. Mgr. Preston. Its object is the mental and moral training of young girls.

Divine Saviour, Society of.— A congregation instituted in Italy for the purpose of caring for the sick in their homes.

Epiphany, Society of the.— A Protestant Episcopal sisterhood, established in 1897 by the Bishop of Washington, D. C. Its objects are the protection and training of the young, and the giving of spiritual assistance to women living in the world by providing retreats and religious instruction for them.

Faithful Virgin, Sisters of the.— An order founded in Normandy, about 1840. Its purpose is the care of orphans.

Good Shepherd.— There are several sisterhoods of the Good Shepherd. The oldest order, the Sisters of the Good Shepherd, was founded by Père Eudes, of the Eudist Fathers, assisted by Marguerite l'Ami, in 1641. The Sisters of Our Lady of Charity of the Good Shepherd of Angers are a community founded by Mother Mary of Saint Euphrasia Pelletier, in 1827. The Sisters of Our Lady of Charity of Refuge were also founded by Père Eudes (1651) and were introduced in America by Rt. Rev. John Timon, bishop of Buffalo, N. Y., in 1855. Each of these orders has for its objects the training of young girls to virtue, and the reformation of fallen women.

Good Shepherd Sisters.— There are now two branches of the sisterhood of the Good Shepherd in the Protestant Episcopal Church in the United States. The Saint Louis branch, incorporated in 1867, has charge over Bishop Robertson Hall, the diocesan school for girls; the California branch, Sisters of the Order of the Good Shepherd, has charge over the Old Ladies' Home, the Sheltering Arms, three hospital missions and the parish visiting.

Helpers of the Holy Souls, Society of.— A congregation which, instituted in Paris, France, was established in New York city in 1892. Its purpose is to visit and nurse the sick poor in their homes and to provide religious instruction to children and adults, all its works being undertaken with the view of helping the souls in Purgatory.

Holy Child Jesus, Sisters of.— A cloistered sisterhood devoted to the care and education of children.

Holy Child Jesus, Sisterhood of the.— An order established by the Protestant Episcopal Bishop of Albany for the purpose of conducting educational and charitable works in his diocese.

Holy Communion Sisters.— There are two branches of the Sisterhood of the Holy Communion in the Episcopal Church, and both are established in New York city. The older branch, which was organized by Rev. Dr. Muhlenberg in 1852, was the first order of Episcopal Sisters to be established in America. Its members are engaged in parish visiting, nursing, the care of the altar service and clerical vestments, and in various kinds of educational and charitable work. The younger sisterhood conducts a shelter for respectable girls.

Holy Cross, Sisters of the.— A congregation founded at Le Mans, France, in 1839 by Very Rev. Anthony Basil Moreau. Its objects are educational and the care of hospitals and orphan asylums. The order is sometimes known as the "Sisters of the Holy Cross and of the Seven Dolors."

Holy Family.— There are several sisterhoods of the Holy Family. The oldest, the Congregation of the Sisters of the Holy Family, a colored sisterhood, was founded in 1842. The Sisters conduct educational and charitable establishments in the archdiocese of New Orleans. The Sisters of the Holy Family of Nazareth was founded in 1874 by Frances Siedliske, a noble Polish lady. The Sisters of the Holy Family in California devote themselves to the relief of the sick and the poor, caring for and educating very young children whose mothers are obliged to work. The Little Sisters of the Holy Family is a community founded at Memramcook, N. B., in 1874. Its one purpose is the temporal care of educational institutions.

Holy Ghost, Sisters of.— An order founded in 1850 by the late Archbishop Hennessy of Dubuque, Iowa. Its objects are: (1) The glory of the Holy Ghost, and (2) the promotion of Christian education. The order of the Sister-Servants of the Holy Ghost was founded in Stell, Holland, in 1889. There is no affiliation between these orders.

Holy Heart of Mary, Sister-Servants of.— An order founded by Rev. Father Delaplace of Paris, France, in 1860. It members conduct all kinds of works of charity.

Holy Humility of Mary, Sisters of the.— A community founded in France, in 1854, by Rev. John Joseph Begel, assisted by Miss Antoinette Poitiers. In 1864 the entire community, with its founder, immigrated to the United States, and settled near the village of New Bedford, Lawrence County, Pa. The works of the Sisters include teaching, the care of the sick, the education of orphans and the decoration of altars.

Holy Names of Jesus and Mary, Sisters of the.— A community founded at Longueuil, Canada, in 1843. Its objects are educational.

Holy Nativity, Sisterhood of the.— An order established in 1883 by Rt. Rev. C. C. Grafton, Protestant Episcopal bishop of Fond du Lac. Its members are engaged in various kinds of missionary and parochial work.

Immaculate Heart of Mary, Sister-Servants of the.— A congregation founded in Quebec, in 1850, by Most Rev. P. F. Turgeon, archbishop of Quebec, assisted by Mr. George M. Muir and Mrs. Mary Fitzback, who became Mother Mary of the Sacred Heart, the first superior of the order. The objects of the congregation are two-fold: (1) The reformation of fallen women, and (2) the education of children. The Daughters of the Immaculate Heart of Mary, instituted in France, perform all kinds of charitable works, conducting academies, orphanages, female industrial schools, kindergartens, homes for working girls, mental and training schools for deaf-mutes, night refuges for homeless women, Indian missions, etc.

Incarnate Word and Blessed Sacrament, Sisters of the.— An order founded at Lyons, France, by Venerable Jane Chezard de Matel, in 1625. The American foundation was made at Brownsville, Texas, in 1852.

Although the order has many houses in various parts of the world they are independent of each other. The Sisters of Charity of the Incarnate Word are an American offshoot of the French community, having been founded by Rt. Rev. C. M. Dubois, bishop of Texas, in 1866.

Jesuitesses.— An institution of women who aspired to live under the vows and rules of the Jesuits. It was abolished by Pope Urban VIII. in 1633.

Jesus, Society of the Faithful Companions of.— A congregation instituted at Amiens, France, in 1820, by Mme. de Bonnault d'Houet (*née* de Bengy). While its main objects were and are the sanctification of souls and the improvement of female education, the order has been engaged in parochial school work for many years.

Jesus-Mary, Religious of.— A congregation founded at Lyons, France, in 1811, by the Abbé Coindre. Its purpose is the care of orphan asylums and the education of young girls, especially in boarding schools.

La Sagesse, Sisters of.— An order founded in 1703 by the Blessed Louis M. Grignon de Montfort, assisted by Miss Louise Trichet, afterward Sister Mary Louise of Jesus. Its works are educational and charitable.

Little Company of Mary.— An order founded about 1870 in Nottingham, England. Its purpose is the care of the sick in their homes and in hospitals.

Little Sisters of the Poor.— An institute established in 1840 by M. la Pailleur, the curé of Saint Servan, in Brittany, and formally approved by the Holy See in 1854. Its object is the establishment of permanent homes for the aged and infirm of both sexes without distinction of creed or nationality. The Sisters of the Poor of Nazareth is an English offshoot from the Little Sisters.

Loreto Nuns.— There are several orders of Loreto Nuns, the oldest being that of the Ladies of Loreto, founded at Munich, Bavaria, by Mme. Maire, in 1650. Its first American house was established at Toronto in 1847.— The Society of Sisters of Loreto, or Friends of Mary at the Foot of the Cross, was founded by Rev. Charles Nerinckz, a Flemish missionary, in 1812.— Another branch of the Sisters of Our Lady of Loreto was established by Mrs. Mary Teresa Ball, at Rathfarnham, near Dublin, Ireland, in 1822. It was from this foundation that have sprung the many convents of Loreto nuns in Ireland. Although not affiliated the objects of the orders are very similar. Their work is educational and missionary.

Marist Sisters.— An order founded by Father Colin of the Marist Order, in 1817. Its objects are educational.

Mercy, Sisters of.— An order founded in Dublin, Ireland, in 1827 by Miss Catherine McAuley, afterward mother-superior. Besides the three vows the Sisters took a fourth to devote their lives to the service of the poor, the sick and the ignorant, an obligation which has been observed so zealously that the order has become one of the most important communities in the world. The sisterhood was introduced into the United States in December 1843, when seven Sisters came from Carlow, Ireland, to establish a convent at Pittsburg, Pa.

Mercy, Sisters of.— The Church of England order of Sisters of Mercy was founded about 1845 by Miss Lydia Sellon at Devonport. The only vow exacted is that of obedience during community life, and members are permitted to withdraw from the convents at will.

Misericorde, Sisters of.— An order founded in 1848 by Mgr. Bourget, assisted by Mme. Roselle Jette, afterward Mother Saint Lucie, superior-general. Its objects are the care of the sick and of homeless infants.

Mission Helpers, Institute of.— Founded at Baltimore, Md., in 1888, its Sisters visit the sick and poor in their homes and give religious instruction to children and adults. The direct object of the community is to advance the perfection and assist in the sanctification of the priesthood.

Notre Dame Sisters.— There are several orders of the Sisters of Notre Dame. That of the School-Sisters of Notre Dame was founded in 1803 by the Venerable Julie Billiart, assisted by her friend, the Viscountess de Gezaincourt. Its object is the salvation of the souls of poor children. The Sisters of Notre Dame are a community founded at Montreal, Canada, in 1657, by the Venerable Mother Marguerite Bourgeoys. Its object is the instruction of youth.

Our Lady of the Holy Rosary, Congregation of.— Founded at Rimouski, Province of Quebec, Canada, 12 Sept. 1879, its object is the Christian instruction and education of the poor.

Our Lady of Good Counsel, Sisters of.— A community founded in 1894 by Bishop Labrecque of Chicoutimi. Its objects are solely educational.

Our Lady of Lourdes.— The order of Our Lady of Lourdes was founded by Archbishop Perche of New Orleans, on 25 Feb. 1883.

Our Lady of Perpetual Help, Sisters of.— An order founded at Saint Damien, Province of Quebec, Canada, by Rev. J. O. Brousseau, assisted by Mlle. Virginia Fournier, afterward Sister Saint Bernard, the first superioress of the community. Its objects are educational.

Our Lady of Sion, Congregation of.— Founded at Strasburg, in 1842, by M. Alphonse Ratisbonne, of a wealthy Jewish family, in commemoration of an apparition of the Blessed Virgin Mary with which, he claimed, he was favored, and which had resulted in his conversion. The rule of the congregation aims at the union of the active with the contemplative life, and its object, which has never changed, is the care and education of converts from Judaism. The most important houses of the congregation are located in Palestine and Syria.

Our Saviour, Regular Canonesses of the Five Wounds of.—A congregation founded at Lyons, France. Its purposes are both educational and charitable.

Poor Handmaids of Jesus Christ.— A congregation of Sisters founded at Dernbach, Germany, in 1851, by Miss Catherine Kaspers. Its rule, which was compiled by Rt. Rev. J. P. Blum, bishop of Limburg, and its objects, which are in the highest sense charitable, were approved by the Holy See in 1870. The order was introduced into the United States in 1868, by Rt. Rev. J. H. Luers, bishop of Fort Wayne, Ind.

Poor Clares. (See SAINT FRANCIS, SISTERS OF.)

Premonstratensians.— The monastic order of Premonstratensians was in affiliation with this order of nuns.

Presentation of the Blessed Virgin Mary, Order of the.— An order founded in Ireland, 1777, by Miss Namo Nagle. At first there was no enclosure and members took simple vows only, which were renewed annually, but, in 1805, Pope Pius VII. raised it to the rank of a religious order with solemn vows and strict enclosure. A fourth vow was then added by which the members bound themselves to devote their lives to the work of instructing poor girls in the precepts of the Christian faith.

Providence, Sisters of.— The Sisters of Providence, who also devote themselves to the instruction of young girls, were founded in Lorraine, in 1762, by the Venerable Jean Martin Moye. The first institution of the order in America was opened at Saint Mary's, near Terre Haute, Ind., 22 Oct. 1840. There are several branches of the Sisters of Providence, including the Oblate Sisters of Providence, the Sisters of Divine Providence and the Sisters of Providence of Kentucky.

Redemptorists.— The Sisters of the Order of the Most Holy Redeemer are affiliated with the Redemptorist order of monks. They are strictly enclosed and contemplative and assist the missionaries by their prayers.

Resurrection Sisters.—There are two orders of Resurrection Sisters in the Episcopal Church of the United States. The Sisters of the Resurrection were instituted by the Bishop of Florida in 1891. Its members conduct an educational and industrial school for orphans. The Sisters of the Order of the Holy Resurrection were founded by the Bishop of Georgia in 1894. The work of the members is of a charitable character.

Sacred Heart, Ladies of the.—The Society of Ladies of the Sacred Heart was founded at Amiens, France, by Père Joseph Varin, S. J., assisted by Mlle. Madeleine Sophie Barat, in 1800. The community, which is semi-cloistered and follows the rule of the Society of Jesus, has for its object the Christian education of youth in boarding and parochial schools.—The Missionary Sisters of the Sacred Heart devote themselves to the care of the sick and the orphan as well as to general educational work.— The Sisters of the Holy Union of the Sacred Hearts, a congregation founded at Douai, France, in 1828, by the Abbé Debrabant, restricts its efforts to works of an educational character. Its rule and constitution were arranged from the somewhat mild rule prescribed for the Visitation Nuns by Saint Francis de Sales.

Saint Agnes.—The Sisters of Saint Agnes were founded at Fond du Lac, Wis., 1 Aug. 1870. Its objects are both charitable and educational.

Saint Ann, The Sisters of, were founded at Vaudreuil, Province of Quebec, Canada, by Mgr. Ignace Bourgot, in 1850. Its objects are chiefly educational.

Saint Augustine, The Sisters of, correspond to the Augustinian monks. While very old and widely represented in Europe there are but two branches of the order in America: The Sisters of Charity of Saint Augustine, established at Cleveland, Ohio, in 1850, by Sisters from Boulogne, France, and the Sisters of the Order of Saint Augustine now in charge of the Hospital of the Precious Blood, founded at Quebec in 1637. In this case the first Sister came from Dieppe, France.

Saint Benedict.— The order of Sisters, corresponding to the monks of Saint Benedict, was introduced into the United States by Rt. Rev. Boniface Wimmer in 1846. The first colony of Benedictine Sisters came

from Eichstädt, Bavaria, and established their convent at Saint Mary's, Elk County, Pa. Many other convents have since been established in various parts of the country, including houses of the orders of the Benedictine Sisters of Perpetual Adoration, and the Oblate Sisters of Saint Benedict (Olivetaners).

Saint Bridget.— The Sisters of Saint Bridget, or the Order of the Holy Faith, was founded in Dublin, Ireland, in 1857. Its purpose is the care over the religious education of poor girls and boys.

Saint Dominic.— The order of Sisters, corresponding to the monks of Saint Dominic, was introduced into the United States by Rev. Thomas Wilson in 1822. The first convent was established at Springfield, Ky., from which mother house convents have been established throughout the country. Their objects are educational and charitable. The Dominican Sisters of the Third Order of Saint Dominic were brought to this country in 1876, by Rev. J. Rochford, O. P., then provincial of the order. The Sisters conduct parochial schools and institutions for destitute children of both sexes. The community of Dominican Sisters known as the Congregation of Saint Catherine de Ricci, was founded by Rt. Rev. Bishop McNerny of Albany, N. Y., in 1880. Their objects are to give retreats for women and young girls, to prepare candidates for the sacraments, and to offer prayers and penance for the conversion of sinners, especially drunkards and blasphemers. The Dominican Sisters of the Perpetual Rosary, as the name implies, are in charge of the management of the Perpetual Rosary in America. Their house at West Hoboken, N. J., was established in 1891 by sisters from Bon Secours, France.

Saint Francis.— The first mother house of the Franciscan Sisters to be instituted in this country was that of the Third Order of Saint Francis established by the late Bishop Neumann at Glen Riddle, Pa., in 1855. At the present time the following orders of Saint Francis are represented in the United States: The Little Franciscan Sisters of Mary, founded at La Bair Saint Paul, Canada, 1891; the Franciscan Missionaries of Mary, founded in British India about 1850; the Sisters of Saint Francis, founded by Very Rev. Pamfilo di Magliano, O. F. M.; the Sisters of Saint Francis of Mary Immaculate, founded in 1865; the Sisters of Saint Francis, established at Buffalo, N. Y., in 1874; the Sisters of the Third Order of Saint Francis, founded by Rev. J. L. Bihn in 1869; the Sisters of the Third Order Regular of Saint Francis, incorporated as the Sisters of Saint Francis of Oldenburg in 1885; the Sisters of Saint Francis of the Sacred Heart; the Franciscan Sisters, founded in 1872; the Sisters of the Third Order of Saint Francis of Assisi, M. C.; the Sisters of Saint Francis, founded in 1875; the School-Sisters of Saint Francis; the Franciscan for Colored Missions, established in 1881; the Franciscan Sisters of the Perpetual Adoration, founded by Rt. Rev. M. Heiss in 1864; Franciscan Sisters of Christian Charity, founded in Wisconsin 9 Nov. 1869; Franciscan Sisters of the Sacred Heart, established in 1876; the Hospital Sisters of Saint Francis, founded in 1875; the Poor Sisters of Saint Francis of the Perpetual Adoration, established in 1875; the Sisters of the Poor of Saint Francis; the Sisters of Saint Francis, founded in 1890; the Franciscan Sisters of the Immaculate Conception, established 1891; the Felician Sisters, O. S. F.; the Sisters of the Third Order of Saint Francis, under the protection of Saint Cunegunda, Polish; the Sisters of the Third Order of Saint Francis of the Congregation of Our Lady of Lourdes, established 1877, and others. The Order of the Poor Clares is also well represented in the United States, the first Sisters having come from Rome, Italy, to open a house in Cleveland, Ohio, in 1875. As the Second Order of Saint Francis, the Clares are the oldest of the Franciscan orders for women, its founder, the virgin Saint Clare, having been received by Saint Francis in 1212.

Saint John the Baptist, Sisterhood of.— An order in the Church of England, founded at Clewer, England, in 1851, and introduced into the United States in 1881. The work of its members is chiefly educational.

Saint John the Evangelist, Sisters of.— The sisterhood of Saint John the Evangelist of the diocese of Long Island is an American order in the Episcopal Church. Its work is chiefly charitable.

Saint Joseph.— There have been several sisterhoods of Saint Joseph, some of which have attained important positions in the religious world. The Lay Hospitallers, Daughters of Saint Joseph, was once one of the great orders of France. It was founded by Marie Delpech, at Bordeaux, in 1638, for the purpose of educating orphan girls, but it did not survive the Revolution.— The Nun Hospitallers of Saint Joseph, an order that also became practically extinct at the time of the Revolution, was founded by Mlle. de la Farre at La Flèche in Anjou in 1643. In addition to the three vows of religion these nuns bound themselves to devote their lives to the service of the poor. At present they are represented by several houses in Canada, one the Hospital of Saint Joseph of Ville Marie, having been founded by Mlle. Jeanne Mance in 1644.— The Sisters of Saint Joseph of the Good Shepherd is a congregation founded by Henri de Maupas, bishop of Puy, in 1650. Dispersed by the Revolution, it was reorganized in 1811. In 1836 six Sisters from Lyons came to the United States at the request of Bishop Rosati of Saint Louis, and they established a house of their order at Carondolet. The Sisters have always conducted all kinds of charitable work, including the gratuitous instruction of poor children and the care of such establishments as orphanages, institutions for the deaf and dumb, Indian and negro missions, and Magdalen asylums. The Sisters of Saint Joseph, an offshoot from the Sisters of Saint Joseph of the Good Shepherd, were established at Toronto, Canada, in 1850 by Bishop Charbonnel.— The Sisters of Saint Joseph of Bourg were founded by Mgr. Devie, bishop of Belley, in 1828. Its members are engaged in teaching and works of charity.— The Congregation of Sisters of Saint Joseph of the Apparition was founded in France by Mme. de Vialard, in 1833. Its members are employed in teaching and in nursing the sick. The Sisters of Saint Joseph of Cluny are a community founded by Anne Marie Javouhey in 1807, although its first house was not formally recognized until 1819. Mother Javouhey was its first superior, and, as soon as possible, she established her Sisters in all the French colonies, where they devoted themselves to the education, the conversion, and the civilization of the negro and other aboriginal races. The Sisters of Saint Joseph of Peace, a community founded in England, devote themselves to the training of girls for domestic service. In 1885 a branch of the sisterhood was established in Jersey City, N. J., by Bishop Wigger, and since that time the American house has extended the scope of its work until it now includes the care of the sick in their own homes, the care of a home and school for the blind, a hospital, and a convalescent and summer home for poor working girls.

Saint Joseph of Nazareth, Sisterhood of.—An order in the Protestant Episcopal Church established in 1892. Its objects are "the mutual improvement in religious knowledge of its members, and the furtherance of religious belief by means of the religious and community life, and afterward the exercise of charity in teaching and training the young."

Saint Margaret, Sisters of.— An order of missionary and nursing sisters, established in the Church of England, at East Grinsted, England, by Rev. J. M. Neale, D.D., in 1855. In 1873 an affiliated house was opened at Boston, Mass., and the American members of the order are engaged in conducting all kinds of hospitals, sanitariums and homes for incurables in various parts of the United States and Canada. Much of the work of the order is devoted to needy colored people.

Sainte Marthe.— The community of the Sister-Servants of Sainte Marthe was founded at Saint Hyacinthe, Canada, in 1890. Its members perform the housework for the diocesan seminary.

Saint Mary.— The institute of the Sisters of Saint Mary was founded by Rev. Dom Jerome N. J. Minsart at Namur, Belgium, in 1834, its object being the education of girls. In 1863 the order was introduced into the United States by Rt. Rev. John Timon, bishop of Buffalo, N. Y.

Saint Mary and All Saints, Sisters of.—An order of colored women trained for work among their own people by the Protestant Episcopal Sisters of All Saints.

Saint Mary, Sisterhood of.— Incorporated in New York in 1865, the Sisterhood of Saint Mary is one of the largest orders in the Protestant Episcopal Church. Its members conduct hospitals, sanitariums, and various other charitable and educational institutions in many parts of the United States.

Saint Monica, Sisters of.—An order established by the Episcopal Bishop of Springfield, Ill., for the purpose of instituting an association of widows "for intercessory prayer and the restoration to the Church of the primitive vocation of consecrated widowhood." The members are engaged in charitable works.

Saint Saviour, Sisters of.—An order in the Protestant Episcopal Church in California. Its members are engaged in the education of young girls.

Sempringham.— The nuns of Sempringham correspond to the order of monks.

Sorrowful Mother, Sisters of the.—A charitable and nursing order founded in Italy and introduced into the United States in 1889, its first house being established at Wichita, Kan.

Theatines.—An order of nuns corresponding to that of the Theatine monks. It was founded by the Blessed Ursula Benincasa in the latter part of the 16th century.

Transfiguration, Sisters of the.— A Protestant Episcopal sisterhood engaged in the care of homeless

children and old ladies. Its labors are confined to Cincinnati, Ohio.

Trinitarians.— The order of nuns corresponding to the Trinitarian order of monks.

Ursuline Sisters.—The teaching order of the Ursulines was founded by Saint Angela Merici of Brescia, in 1537. Organized in Angela's kitchen as "The Company of Saint Ursula," its first objects were the nursing of the sick, the teaching of young girls and the sanctification of their own lives. At this time the members remained in the world, took no vows, and received communion in common once each month. The conversion of the society into a religious order was chiefly the work of Mme. de Sainte Beuve, a French woman, who built and endowed a convent for the congregation at Paris in 1610. Two years later Pope Paul V. enclosed the nuns, placed them under the rule of Saint Austin, with solemn vows, including a fourth, binding them to devote their lives to the instruction of the young. The Irish Ursulines were established at Cork in 1771, by Miss Namo Nagle, and the first Ursuline convent instituted in the United States was founded by nuns from France at New Orleans 7 Aug. 1727.

Visitation Nuns.—The Order of the Visitation was founded at Annecy in 1610 by Saint Francis de Sales, assisted by Saint Jane Frances, Mme. de Chantai, their object being to found a retreat for persons desirous of the religious life, but who were too weak, or otherwise undisposed, to enter an austere order. As the result there were few corporal austerities, and little confinement, although the employment of time was minutely provided for. In 1618 the rule of the enclosure was adopted, and, although teaching was not a part of the founder's plan, all the American convents have devoted their attention closely to educational work. The first Visitation convent in the United States was established at Georgetown, D. C., in 1799.

DEACONESSES.

The office of deaconess was one that was well recognized in the apostolic church, for while it may be questioned whether the certain references in the New Testament which have so generally been associated with the government of deaconesses really applied to them or not, the fact remains that some of the earliest writers of the Church recognized their usefulness and formulated rules of conduct for them. According to these rules it was necessary that a woman, to be a deaconess, should have been the widow of but one husband and that she should have borne children. It is true that exceptions were sometimes made and that virgins were occasionally admitted to these organizations, but this was a rare honor, it being the opinion of the church authorities that no woman who had not been a wife and a mother would be able to feel that sympathetic devotion to her work which was so necessary to its success. As that was the time prior to the institution of sisterhoods and as the deaconesses were the only women who were officially authorized to assume church work, there were many duties to which they were called. Among these was the care of the sick and poor, the ministering to those who were confined in prisons for conscience sake, the instruction of catechumens in the principles of their faith; assistance at the baptism of women, in addition to which they were supposed to exercise a general oversight over the female members of the congregations, both in public and in private, and were obliged to make regular reports that the bishops and elders might not be uninformed as to the conditions existing among their people. The work of the deaconesses continued until the middle of the 5th century. In the Greek Church such orders existed until the 12th century. Gradually, however, the sisterhoods took their place in the Church, and it was not until the 19th century that they were again revived, this time by the Protestant churches who felt the need of the assistance of women in conducting their religious work. The first order of deaconesses to be instituted in the modern church was in 1835 when Pastor Fliedner of Kaiserswerth, Prussia, established such a society in order that he might have an organized corps of nurses at his new infirmary, and the experiment was so successful that it was immediately copied by the Lutheran bodies in other parts of Europe. As instituted by Pastor Fliedner the "Order of Deaconesses of the Rhenish Province of Westphalia" was composed of three classes of members. The first class devoted themselves to the care of the sick poor and the rescue of fallen women by the means of Magdalen homes; the second class were engaged in teaching; while the third class, or visitation deaconesses, assumed the responsibilities of the regular parochial work. The members took no vows, and while plainly dressed, wore no distinctive habit. In 1849, at the request of the American church authorities, Pastor Fliedner brought four nurses to the United States where he established a home in Pittsburg. In the Episcopal Church the work of the deaconesses is almost as important as that of the sisterhoods, it being of very much the same character. It is largely represented in the South, the branches in Georgia, Alabama, Kentucky, and Louisiana being important factors in the religious work of the denomination. The revival of deaconess work in the Methodist Church dates from about 1870, when the Bethany Society was organized in Germany. Like the Order of Deaconesses established by Pastor Fliedner, its members were devoted chiefly to nursing, a work which they conducted so successfully that there are now more than 200 of them engaged in the various German hospitals. The first effort to introduce the order into the United States was in 1886, when Rev. J. M. Thoburn, at a conference held at Bellefontaine, Ohio, urged the advantage that the Methodists of this country would gain from the institution of a deaconess home or training school. As the result, Miss Jane M. Bancroft, now Mrs. Robinson, was sent to Germany to acquaint herself with the work of the organization and, in October 1887, a Deaconess Home was opened in Chicago. The next session of the General Conference signified its full approval of the movement and, in 1888, the present system of permanent deaconess work was inaugurated under the direction of the Woman's Home Missionary Society. According to the rules of conduct the purposes of the deaconesses are "to act as pastors' assistants; to visit from house to house; to assist in evangelistic work; to conduct meetings, especially those for women and children; to conduct kindergartens, kitchengartens; and other industrial and educational schools; to visit in prisons and police stations; to conduct orphanages, hospitals and other institutions of mercy; to nurse among the sick poor, etc., and to assist in office and clerical work." The Deaconess Society of the Methodist Episcopal Church was organized in 1895. It conducts hospitals, orphanages, and schools, as well as other charitable works under the direction of its licensed deaconesses. The German Methodist deaconess homes and hospitals are under the control of the German Central Deaconess Board. The work of its deaconesses comprises, beside hospital service, nursing in private families, parish work, free dispensaries, kindergartens, industrial and sewing schools, etc. It has 78 deaconesses who operate five hospitals. The "Martha-Maria" Deaconess Society in Germany, which now operates in association with the Bethany Society, was originally organized by the Wesleyan Church. While now in perfect harmony with the sister institutions it still maintains its distinctive organization. Except in some few instances in the Protestant Episcopal Church the present-day deaconesses take no vows and may withdraw from the service of the Church at any time without reproach to themselves. They are usually disciplined during two probationary years, and, while they are unsalaried they are assured of ample support, with a good home and tender care during sickness or old age. It is now customary in the United States for deaconesses to wear a habit, chiefly for purposes of recognition and protection, and, generally, they now live in communities or homes.

JOHN R. MEADER,
'American Almanac.'

Orders (Royal) and Decorations of Honor. The desire to possess honorary distinctions has shown itself in one form or another since the earliest days of civilization. The ambition to wear something that shall distinguish one from one's fellows is scarcely stronger to-day that it was when the Egyptians, Assyrians, Persians, Greeks and Romans were the great nations of the earth. In the old days rings, gold chains, belts, «triumphal gifts,» etc., conferred the distinction on personal merit as discriminated from official rank and hereditary nobility, but the ribbons, chains and jeweled badges of later centuries convey the same meaning and the privilege of wearing them is prized as highly as if they had never been ridiculed as foolish forms of masculine vanity. It was the appreciation of this sentiment that influenced Napoleon in the institution of the «Arms of Honor.» In vain old republicans, jealous of their new prerogatives, protested against what seemed like the re-establishment of a «gewgaw of vanity,» suitable perhaps for an effète monarchy but unworthy of the serious consideration of citizens of a new republic. The Consul,

however, was not to be dissuaded. «You call them toys?» he answered, «Well, learn that it is through such toys that men are led!»

Concisely stated, the organized and duly constituted bodies of knighthood are of two classes: (1) the associations, or fraternities, possessing property and rights of their own as independent bodies, and (2) honorary associations established for specified purposes by sovereigns within their respective dominions. To the former belong the three great religious orders created during the Crusades, the Templars, the Hospitallers, and the Teutonic Knights. (See ORDERS, RELIGIOUS.) To-day the strictly religious orders are comparatively extinct, but the more secular orders which they inspired exist under almost every flag, Switzerland being the only nation of importance which has nothing that resembles an order of distinction.

The Knights Hospitallers of St. John the Baptist in Jerusalem, afterwards known as the Order of Saint John of Malta, formed the most powerful of all the religious orders. It was about the middle of the 11th century that the organization had its inception, when a number of merchants from Amalfi erected a large hospital on the spot where, acording to tradition, the «Last Supper» had been held. In 1104 these Pilgrims of the Hospital were constituted Knights by Baldwin I., and their rule, which was that of Saint Augustine, was confirmed by Pope Pascal II., in 1113. Driven from Jerusalem, and afterward, from place to place by the martial vicissitudes of the times, they finally seized upon the Island of Rhodes, which they retained until 1522, when, upon being expelled, they went to Malta, which, with Gozo and Tripoli, was granted to them in fee by Emperor Charles V., in 1830. During the period of the Reformation, as well as in subsequent years, the Order was abolished in some portions of the country, and, in 1798, having been dispossessed from Malta by Napoleon, the Knights settled in the Papal States, from which headquarters the Order has been to some extent revived. Originally the Order maintained a class for women, «The Ladies of the Order of Saint John,» which was founded by Agnes, Abbess of the House of Saint Mary Magdalen, in 1099.

Of the early fraternities, the Order of the Holy Sepulchre was one of the most ancient. Sometimes, but probably erroneously, attributed to Saint Helena, it is generally believed that this Order was instituted by Baldwin I., King of Jerusalem, about the year 1110. As originally founded it was restricted to the priesthood and this restriction was not removed until 1484, when Pope Innocent VIII. incorporated it with the Order of the Knights of Saint John of Jerusalem. Two ineffectual attempts were made to sever the bond of union, but in 1496, Pope Alexander VI., who took so much interest in the Order that he may almost be regarded as its real founder, transferred the power of admitting Knights to the Holy See, and, from that time, the Order was changed from a religious association to a fraternity of chivalric character.

The Templars originated about 1120, under Baldwin II., when nine gentlemen and two nobles appeared as Pilgrims at Jerusalem. Adopting the rule of Saint Augustine they took up their abode in the Holy City, and gradually extended their influence until they became one of the most powerful confraternities, under the name of «Brethren of the Militia of the Temple.» In an evil hour, however, they incurred the animosity of Philip le Bel and of Pope Clement V., and, in the year 1312, the latter announced the suppression of the Order in France. Although it is still doubtful whether the action of Pope Clement was just or unjust, his example was followed by the whole of Europe, and the final blow was struck when the last Grand Master, Jacques de Molay (q.v.), was executed at the stake, in France, in 1313. The Order has never been revived.

The Teutonic Order, the last of the great religious fraternities, was founded at Jerusalem, in the 12th century. Prior to its organization German pilgrims had received scant attention at the Holy City. Needy pilgrims from France and Italy found the Templars and the Hospitallers ready to receive them, so this new Order was formed with the object of attending to sick and wounded Germans. In 1191 Frederick of Swabia gave the Order a constitution which established the rule of Saint Augustine and adopted regulations governing the practice of all duties. Regarding the treatment of the sick and the poor the regulations were similar to those of the Knights of St. John, while the regulations respecting peace and war were identical with those of the Templars. With the sanction of Pope Celestine III., Frederick gave the association the name of «The Order of the German House of the Holy Virgin at Jerusalem.»

The Teutonic Order achieved the height of its power soon after its renovation, in the 13th century, but this period of luxury was followed by one of anarchy, and, in the 15th century, after the Twelve-Year war, it became feudatory to Poland. After the Peace of Cracow, 1525, the original Order was abolished and its territories were given as fief of Poland to the Grand Master Albert, Margrave of Brandenburg, who assumed the title of «Administrator in Prussia and Grand Master of the Teutonic Order in Germany,» and this condition continued, with various interruptions, until 1805, when, at the Peace of Presburg, the Emperor of Austria was invested with all the rights, dignities, etc., appertaining to the Grand Mastership. Four years later, however, Napoleon abolished the Order in the Rhenish Province and apportioned all its lands among the neighboring princes, but the Congress of Vienna restored most of the property and, eventually, in 1840, an Imperial decree declared it an independent fief of the Austrian Empire.

At the head of the great secular orders which still maintain their pristine reputation stands the Most Noble Order of the Garter, membership in which is still restricted to English and foreign royal and imperial personages and to such peers of the realm as it may be desirable to recognize. Next in rank and antiquity is the Order of the Golden Fleece, which is not only the most important of the Austrian Orders but which is the principal decoration of the Spanish crown. Founded by Philip, Duke of Burgundy, in 1429, the Grand Mastership remained in his house until Charles the Bold died without male issue, when it passed to Emperor Maximilian of Germany, the son-in-law of the Duke. When the House of Hapsburg ceased to rule in Spain, at the beginning of the 18th

century, the Golden Fleece became the subject of a violent quarrel. The new king insisted that the Order was a possession of Spain, while the Hapsburgs, as represented by the German Emperor, refused to relinquish the honor, claiming that it belonged exclusively to their House. There the matter rested, for while both claimants still persist in exercising the right to bestow the Order no person who has received the Fleece from the hands of Spain is permitted to display the insignia at the court of Austria.

The third of the great mediæval Orders is that of the Most Sacred Annunziata, the principal order of Italy, which was created by Amadeus of Savoy in 1362. Called by Favin, "the Order of the Snares of Love," and known at various periods as "the Collar" and "Love-knots," for the reasons for which one must turn to tradition, its importance is indicated by the fact the its chevaliers are styled "cousins of the King," all of whom, with their wives, participate in the honor of this relationship to royalty.

The only insignia of distinction ever authorized by the Congress of the United States are the medals of honor for exceptional bravery in war and for life saving, which from time to time have been sanctioned by the government. France, too, continues to show a distaste to chivalric orders and remains satisfied with its republican decoration, the Legion of Honor, which, however, is not nearly so closely restricted as are the awards of honor made by the United States.

The following is a complete list of the Orders and other decorations worn by the citizens of the various nations of the world, those which are sometimes worn but which are no longer conferred being specified:

ABYSSINIA.—The Order of Solomon's Seals, also known as the Order of Saint George, was founded by Emperor John in 1874. The Emperor also confers a decoration known as the Order of the Star, but it is impossible to learn the date of its origin or to discover authentic data respecting its history.

AUSTRIA-HUNGARY.—The chivalric Order of the Golden Fleece which was founded by Philip the Good, Duke of Burgundy, 10 Jan. 1429, and was extended under the statutes of 27 Nov. 1840, is regarded as of such importance as a dignity that its knights have precedence over all others at court functions, both in Austria and in Spain. The military Order of Maria-Theresa was founded 13 May 1757, by Empress Maria Theresa, as a recognition of officers distinguished in war. It is of three classes, the third, or Commander's Class, having been added by Emperor Joseph II. The Order of Saint Stephen of Hungary, which was originally intended to be the National Order of Hungary and its most important reward for civil merit, was founded by Maria Theresa, 5 May 1767. While the Order of the Iron Crown was founded by Napoleon, in his capacity of King of Italy, on 5 June 1805, and originally bore the title of "Ordine della Corona di Ferro," it was extinguished in 1814, and was not re-established until two years later, when, 12 Feb. 1816, Emperor Francis I. assumed the office of Grand Master and declared it to be inseparably united to the Imperial Crown of Austria, a circumstance which has led several authorities to hold that it should be regarded as a new order rather than the revival of an old one, especially as both the form of its decoration and its statutes have been changed. The Order, which now comprises three classes, is open to personal merit without other qualification. The Order of Leopold, was founded by Emperor Francis I. 7 Jan. 1808, the day after his marriage to Louise of Austria-Modena. It is a distinction for personal merit solely. The Order of Francis Joseph, a reward for distinguished merit in all classes, was founded by Emperor Francis Joseph I. 2 Dec. 1849. The Military Foundation of Elizabeth Theresa was created by Empress Elizabeth Christine, widow of Emperor Charles VI., and was rejuvenated by Empress Maria Theresa in 1771. The Teutonic Order has already been described. Austria-Hungary also possesses two orders to which women only are admitted. The older, the Order of the Starry Cross, was founded upon religious principles by the Dowager Empress Eleanore, widow of Emperor Ferdinand III. 18 Sept. 1668, under the name of "The Order of the Community of Noble Ladies of the Stary Cross." The second, the Order of Elizabeth, was instituted by Emperor Francis Joseph 17 Sept. 1898, soon after the assassination of his wife. It is intended as a reward of merit for women who have achieved distinction in the various professions. The less important Austrian decorations are: The Cross of Merit for ordinary soldiers, founded by Emperor Francis II. 23 Nov. 1801, and the Cross of Merit for officers, created by Emperor Francis Joseph 22 Nov. 1849. By a statute adopted 7 July 1874, it was provided, in the case of the latter order, that after the death of the person decorated the decoration should revert to his heirs. The Medal of Honor of Austria-Hungary is the decoration bestowed upon those who excel in the arts and sciences. It was founded on 18 Aug. 1877 by Emperor Francis Joseph, while the Souvenir Medal of the Jubilee was created by Emperor Francis Joseph on 18 Aug. 1898.

BELGIUM.—Belgium possesses but few orders: The Order of Leopold, civil and military, which was founded by King Leopold I. 11 July 1832; the Order of the Iron Cross, a civil decoration, which was founded 21 July 1867, but which originated in the Decoration of Honor, or Order of Civil Merit instituted by the National Congress of Belgium in 1830, and the Military Cross of two classes which was instituted 11 Feb. 1885. Of the five classes which are included in the Order of Leopold the three inferior classes carry pensions.

BOLIVIA.—The insignia of the Order of the Cross of Christopher Columbus, which was founded in 1892, is still worn, but the Order is no longer conferred. (Three classes.)

BOKHARA.—The reigning Ameer of Bokhara still confers three Orders, that of Alexander III., founded in 1898; the Order of the Crown of Tadsh, founded in 1886 and afterward sanctioned by Russia, and the Order of the Star of Bokhara, in three classes, instituted in 1860.

BRAZIL.—Although all the Brazilian decorations with the exception of the two medals of merit were suppressed by the Constitution of 1891, the following practically extinct Orders are sometimes referred to: The Imperial Order of the Southern Cross, founded 1 Dec. 1822 by Emperor Pedro I., the Order of Pedro I., founded 16 April 1826 by Emperor Pedro I., and re-organized by his son 19 Oct. 1842; the Imperial Order of the Rose, founded 17 Oct. 1829 by Emperor Pedro II., the Order of Christopher Columbus, created 6 June 1890, and the Medal of Merit, which was founded 15 Dec. 1889. In addition to these the sovereigns of Brazil formerly conferred the decorations of the Orders of Christ, Saint Benoit of Aviz, and Saint James of the Sword, all of which were of Portuguese origin and were adopted as Brazilian Orders 9 Sept. 1843.

BULGARIA.—By the force of circumstances the orders possessed by Bulgaria must be of extremely recent origin, but all are distinguished by the fact that they are conferred for individual merit only, either for bravery in time of war, or for meritorious achievements in the arts and sciences. The oldest, the Military Order of Bulgaria, for bravery in time of war, was founded 17 April 1879 by Prince Alexander. It includes a grand cross and four classes for officers and four classes for soldiers. The Order of Alexander, to which is added the Medal of Merit with sword of honor for officers, and the Medal of Merit, in three classes, was founded 25 Dec. 1881 by Prince Alexander I., and extended 14 Aug. 1888 by Prince Ferdinand. The Medal of Merit for distinction in the arts and sciences was founded by Prince Alexander 24 March 1883. Both the Order of Civil and the Order of Military Merit were instituted by Prince Ferdinand. The former was founded on 14 Aug. 1891; the latter 30 May 1891. The Military Cross, the reward for military service rendered faithfully for twenty years, applies to private soldiers as well as to officers, the medals for officers being of silver, while those for the privates are of bronze.

CHINA.—The only order which is bestowed in China is that of the Imperial Dragon. It was instituted in 1862, under the name of the "Order of the Precious Star," its purpose being the reward of foreigners who performed valuable services for the Empire. In some respects it was modeled after the British Order of the Bath, and the British General (then Colonel) Gordon, who suppressed the Taiping Rebellion, was the first person who received the decoration. For many years the Order was not again conferred, but 7 Feb. 1882 it was re-organized by Emperor Kouang-su, and has since been known as the Order of the Double Dragon. It possesses five classes, the first three being

subdivided into three grades each, and it is carefully specified to what character of person each grade shall apply, the distinctions, which range from "sovereigns" to persons of "the commercial class," being distinguished by the different kinds of stones set in the insignia.

DENMARK.—Although Denmark confers many medals it possesses only two orders, but both are of great antiquity. The Order of the Elephant, for example, is so ancient that its origin is lost in tradition. By some it has been attributed to the period of the First Crusade, by others to Canute VI., in the 12th century, while still others refer its institution to the 15th century, when it is supposed to have been founded by Christian I. If the Danish authorities are to be relied upon, however, the part played by Christian I. in the history of the Order was that of *restorer* rather than of *founder*, for they insist that it was originally of a religious character, having been known as the "Society and Fraternity of the Holy Virgin Mary," and that he re-organized it. It is at least certain that it was again renovated 1 Dec. 1693, when Christian V. altered its statutes, making profession of the Evangelical religion one of its requirements, and gave it the name it bears to-day. The Order of Danebrog, which is conferred only upon Danes, also makes claim to a record of great antiquity, as it is said to have been instituted by Waldemar II. in 1219 in commemoration of a miraculous intervention in battle, when the appearance of a flag, red with a white cross, in the heavens revived the courage of the Knights of the Sword and inspired their subsequent victory. At the time of the renovation of the Order of the Elephant this Order was also re-organized by Christian V. and 29 June 1808 it was changed from a court honor to an honor of merit, unrestricted as to age, rank or the number of members, by King Frederick VI. The Danish medals are: Medal for Life-saving, founded 29 Aug. 1798; Medal of Merit, founded by King Christian VIII. 24 July 1845; Medal of Reward, founded by King Christian IX. 26 May 1886; Medal of Arts and Inventions, founded 31 Aug. 1841 by King Christian VIII., and the Military Medals awarded to the non-commissioned officers of the army and navy for the wars of 1848–50 and 1864.

FRANCE.—In addition to the Order of the Legion of Honor, which was founded by Napoleon 19 May 1802, France has the following medals of decoration: The Military Medal, founded by Napoleon III.; the Medal of Honor, founded by President McMahon; the Medal of Merit, agricultural, founded by President Grévy; the Colonial Medal, founded in 1893, for military services in the colonies and countries under the protection of France; the Medal of Honor, created by decree in 1897; the bronze Medal of Reward for bravery in the performance of duty, founded in 1899, and the Medal of Honor, in silver, for commercial workmen, founded by decree in 1900. The French orders which are no longer conferred are: The Order of the Holy Ghost, founded in 1578 by King Henry III.; the Order of Saint Michael, founded 1 Aug. 1469 by King Louis XI.; the Order of Saint Louis, founded as a reward for military bravery by King Louis XIV. in 1693, and the Order of Saint Hubert, founded 31 May 1416, by Louis I., Duc de Bar. The colonial orders are as follows: Anjou, Order of the Star; Annam, Order of the Dragon; Cambodia, Royal Order of Cambodia, instituted by Sultan Nur-ed-din 8 Feb. 1864; Dahomey, Order of the Black Star, instituted by King Toffa in 1894 and recognized by the Grand Chancellor of the Legion of Honor; Tajurah, Order of Nishan-el-Anuar; Tunis, Order of the Husseinite, founded by Sultan Sadi Ahmed Bey; Ahed el Aman (two classes), founded by Bey Mohamed al Sadak 1859, and Nishan el Iftikhar (six classes), founded by Sultan Sadi Ahmed Bey 1850.

GERMANY.—The German orders are numerous, every kingdom, principality and duchy of the Empire having a multitude of its own, to all of which, with possibly a few exceptions, the Emperor belongs. The orders of Bavaria are among the most ancient, some claiming to have been introduced from the Holy Land during the Crusades, and yet, in matter of importance of its orders, Prussia takes precedence. The Order of the Black Eagle is the greatest, as, to be eligible, one must be able to show a lineage on both sides of the house for at least four generations. The following is a list of the German decorations:

Anhalt.—Order of Albert the Bear (five classes and two medals), created 4 April 1807 by Grand Duke Charles Frederick. On 29 April 1901 the Order was extended by Duke Frederick of Anhalt by the creation of a crown for distinguished services. The Order of Merit, for success in the arts and sciences, was created by Duke Frederick of Anhalt 30 July 1873.

Baden.—The Family Order of Loyalty, or Fidelity, was created 17 July 1715 by Margrave Charles William of Baden-Durlach. The Order of Military Merit of Charles Frederick was created 4 April 1807 by Grand Duke Charles Frederick. The Order of the Lion of Zahringen (five degrees) was founded 26 Dec. 1812, by Grand Duke Charles in memory of the baptismal day of his consort. The Order of Berthold I. was formerly the title of the class of the Grand Cross in the Order of the Lion of Zahringen, but was proclaimed a separate order by Grand Duke Frederick 9 Sept. 1896. The other decorations of Baden are: The Military Medal of Merit of Charles Frederick, in gold and silver, founded 4 April 1807; a Cross commemorative of the campaign of 1870–1, created 25 June 1871 by Grand Duke Frederick; Cross of Merit of the Lion of Zahringen, founded by Grand Duke Frederick 29 April 1889; Medals of Merit for Life-saving, in gold and silver, created by Grand Duke Charles Frederick and Grand Duke Frederick; the Distinction for long service in the active army, created by Grand Duke Leopold 18 Feb. 1831, and the Medal commemorative of the suppression of the revolt in Baden, 1849, created by Grand Duke Leopold 29 August of that year.

Bavaria.—Bavaria possesses several extremely ancient orders. The Order of Saint Hubert was founded by Gebhard V., Count of Ravensberg, in commemoration of his victory over Count Arnold of Egmont, in 1444. It is an order that is conferred only upon royal personages and is one of the highest decorations in the Empire. The chivalric Order of Saint George is usually accredited to the Elector Charles Albert, 1729, but Bavarian authorities claim that it was introduced from the Holy Land early in the 12th century, that it was extended by Maximilian I., and that it was merely renovated by the Elector. It is conferred only upon Roman Catholics and even then only upon those having no other order. The Military Order of Maximilian was created by the Elector Charles Theodore 8 June 1797, and 1 Jan. 1806, the day he assumed his royal title, it was raised from a military decoration to royal rank by King Maximilian Joseph. As an order it ranks high, the possession of either of its three classes conferring nobility. The civil Order of the Crown of Bavaria was created 19 May 1808 by King Maximilian Joseph. It was instituted as recognition of civil merit, but possession of either of its four classes confers nobility. The Order of Saint Michael, instituted as a distinction for civil merit for Roman Catholics of noble descent, was created by Joseph Clement, Elector of Cologne and Duke of Bavaria 29 Sept. 1693. It has since undergone many modifications. The Maximilian Order, instituted as a recognition of success in the arts and sciences, is conferred only upon Germans. It was founded 28 Nov. 1853 by King Maximilian II. and was extended by Luitpold, Prince Regent, 18 Dec. 1886. The Order of Military Merit (six classes) was founded 19 July 1866, by King Louis II., and the Royal Louis Order, conferred only upon those who hold the title of "Counseller," was created 25 Aug. 1827, by King Louis I. There are four Orders in Bavaria which are confined to women. They are: The Order of Theresa, founded by Queen Theresa 12 Dec. 1827; the Order of Saint Elizabeth, founded for ladies of Roman Catholic faith by the Electress Elizabeth Augustine 12 Oct. 1766; the Order of Saint Anne, provided for ladies of nobility of Munich, all of whom receive pensions, was founded by the Electress Anne-Maria-Sophia 6 Dec. 1784, and the Order of Saint Anne, for ladies of Würzburg, was established by the Elector Maximilian Joseph 12 July 1803. The other Bavarian decorations are as follows: The Medal of Saint George, founded 15 Dec. 1889 by Prince Luitpold, Regent of Bavaria; the Medal of Louis for achievements in the arts, sciences and industries, founded by King Louis II. 25 Aug. 1872; the Medal for Life-saving, founded by Prince Luitpold 27 Feb. 1889; the Medal of Honor for Voluntary Services rendered to sick persons, founded by Prince Luitpold 5 March 1901; the Cross of Merit for Firemen, created by Prince Luitpold 5 March 1901, and the Cross of Merit, for women, created by King Louis II. 13 May 1870.

Brunswick.—The Order of Henry the Lion was instituted as a reward of distinction for military and civil service as well as for achievements in the arts and sciences. It was founded by Duke William 25 April 1834, and has been extended several times until it now includes five classes and one Cross of Merit in two classes. The other decorations of Brunswick are: A Medal for Life-saving, founded 25 April 1836 by Duke William, and a Medal commemorative of the campaign of Schleswig-Holstein, 1848–9, founded 8 May 1891 by Prince Albrecht of Prussia.

Hesse.—The Electoral Orders of Hesse are no longer conferred. They consist, however, of the Order of the Golden Lion, founded by the Landgrave Frederick II. in 1770; the Order of Military Merit, founded

in 1669 by the Landgrave Frederick II., and the Order of the Iron Casque, founded 18 March 1814 by the Elector William I. The Grand Ducal Orders of Hesse are still conferred and recognized. They are: The Order of Louis, for civil and military merit, founded by Grand Duke Louis 25 Aug. 1807; the Order of the Golden Lion, conferred only upon persons of princely rank in the House of Hesse, founded by Landgrave Frederick II. 14 Aug. 1771; the Order of Merit of Philip the Good, founded 1 May 1840 by Grand Duke Louis II. The other decorations are: A Cross of Military Merit, founded 12 Sept. 1870 by Grand Duke Louis III.; the Order of the Military Sanitary Cross, a reward for those, irrespective of sex, who attend the sick or wounded soldiers, founded 25 Aug. 1870 by Grand Duke Louis III.; a Cross for distinguished services to the sick, created by Grand Duke Louis IV. 18 April 1891; a Medal of Merit for the arts, sciences, industries and agriculture, founded 21 May 1853 by Grand Duke Louis III.; a Medal for Life-saving, and a General Medal of Honor, founded 14 Nov. 1849 by Grand Duke Louis III.

Hohenlohe.—The Order of the Phœnix of the House of Hohenlohe is self-conferring and perpetual with the permission of the sovereign. It was founded 29 Dec. 1757 by Philip Ernest I., Prince of Hohenlohe-Waldenburg-Schillingfurst, and was created with new statutes in 1795 by Prince Leopold of Hohenlohe-Bartenstein.

Lippe and Schaumburg-Lippe.—The Cross of Honor of Lippe was founded in common by Prince Leopold of Lippe and Prince Adolph of Schaumburg-Lippe 25 Oct. 1869. In Lippe it consists of four classes with one Cross of Merit; in Schaumburg-Lippe of five classes and one Cross. The other decorations of Lippe are: "The Rose of Lippe," a distinction for the arts and sciences; Civil and Military Medals of Merit, and a Medal for Life-saving.

Mecklenburg-Schwerin and Strelitz.— The Order of the Crown of the Wendes of the House of Mecklenburg was founded in common by Grand Duke Frederick Francis II. of Mecklenburg-Schwerin and Grand Duke Frederick William of Mecklenburg-Strelitz 12 May 1864. It consists of three classes and one Cross of Merit, the highest class being open to ladies of exalted rank, 96 being selected from Schwerin and 32 from Strelitz. Mecklenburg-Schwerin also confers the Orders of the Griffin, established 15 Sept. 1884 by Grand Duke Frederick Francis III. as well as the following minor decorations: A medal in gold and silver, instituted in part for the arts and sciences and in part for "brave men and good citizens," created by Grand Duke Frederick Francis I., a Medal of Merit, created by Frederick Francis II. 28 Feb. 1859; medals for life-saving and merit, created by Grand Duke Frederick Francis III. 19 March 1885; a Medal of Honor for life-saving during times of flood, created by Grand Duke Frederick Francis III. 21 June 1888; Medals in memory of Grand Duke Frederick Francis III, instituted by the Duke Regent, Jean Albert, 21 April 1807; a Cross of Military Merit, created 5 August 1848; a Cross of Military Service for officers and employees of the army; a Cross for non-commissioned officers; a Medal for Service in the "landwehr"; a Military Medal commemorative of the campaign of 1848, and Medals for members of the ancient military corporations, founded by Duke Regent John Albert 2 Dec. 1889.

Oldenburg.—The Order of Merit of the Ducal House of Peter Frederick Louis, founded by Grand Duke Paul Frederick August, in memory of his father, 27 Nov. 1838; a Medal of Merit for life-saving, created 17 Jan. 1848, and a Cross of Merit for devotion and fidelity in time of war, founded by Grand Duke Peter 12 July 1871.

Prussia.—Although the Orders of Prussia are not of great antiquity several of them rank high among the decorations of the world. The Order of the Black Eagle, which was founded by King Frederick I. 17 Jan. 1701, in commemoration of his coronation, is one of the most important. Its membership is limited to 30 knights, exclusive of princes of royal blood, and all must prove noble descent for not less than four generations. The Order of the Red Eagle was created 17 Nov. 1705 by George William, Crown Prince of Brandenburg-Baireuth, as the "Order of Sincerity." In 1712 it was organized as an order of the House of Hohenzollern; was reorganized as an order of five classes by William I. 18 Oct. 1861, and was extended by the addition of a royal crown to the crosses of all classes by William II. 12 June 1892. The Order of Civil and Military Merit was created in 1667 by the Prince Elector Frederick as the "Order of Generosity." In 1840 it was reorganized by Frederick II. as the "Order for Merit"; in 1810 Frederick William III. made it an order of Military Merit, and 21 May 1842 William IV. extended it to the civil class for science and arts, to include 30 Germans and an equal number of foreigners. The Royal Order of the House of Hohenzollern was founded by Prince Frederick of Hohenzollern-Hechingen in common with Prince Charles of Hohenzollern-Sigmaringen 5 Dec. 1841; the Order of the Crown of Prussia was created as an Order of Merit by William II. 18 Jan. 1901; the Royal Order of the Crown was founded by William I. in commemoration of his coronation 18 Oct. 1861; the Order of the Iron Cross was created by Frederick William III. 19 March 1813, and the Order of William was founded by William II. 18 Jan. 1896. The Order of Louise, which is bestowed upon women in recognition of service in war, was founded by Frederick William III. 3 Aug. 1814, and the Cross of Merit for women was created by William I. 22 March 1871. In 1812 the new Commandery of Brandenburg of the Order of Saint John of the Hospital of Jerusalem, a "Royal and Protestant Order of Saint John" into which the knights of the abolished Order were received, was founded by Frederick William III., and, in 1852, it was reorganized by Frederick William IV. Other decorations conferred by Prussia are: The Medal of Benevolence with ribbon, created by Frederick William III. 16 Aug. 1833; the Medal of the Red Cross, founded by William II. 18 Jan. 1896, and the Cross of the Medal of Honor, founded by William II. 27 Jan. 1900.

Reuss, Senior Branch.—The only decoration is the Cross of Honor created by Prince Henry XX. 15 Sept. 1858. The Junior branch bestows five decorations: The Cross of Merit, founded by Prince Henry XVII. 20 Oct. 1857; the Cross of Honor, founded by Prince Henry XIV. 24 May 1869; the Cross of Merit for the arts and sciences, created by Prince Henry XIX. 23 May 1885, and the Medal for Life-saving and the Medal of Honor for 30 years of faithful service, both of which were founded by Prince Henry XIV. 1 April 1896.

Saxony (Royal).—The Order of the Rue Crown of the House of Saxony, instituted at the suggestion of Napoleon at the time of Saxony's elevation to a kingdom was founded by King Frederick Augustus I. 20 July 1807; the Military Order of Saint Henry was founded by the Elector Frederick Augustus II. 7 Oct. 1736; the Order of Merit was created by King Frederick Augustus I. 7 June 1815; the Order of Albert the Valorous, for merit in science and art and for civil virtue was founded by Frederick Augustus II. 31 Dec. 1850, and the Order of Sidonia, for women, as a reward for services during war, was created by King John 6 May 1871. In addition, the Royal House of Saxony confers a Medal for Honor, created 31 Jan. 1876 by King Albert; the Medal of Carola, founded 17 Sept. 1892 by King Albert, and a Medal for Life-saving, created in 1831. (Ducal) The Grand Ducal House of Saxony confers the following decorations: The Civil and Military Order of Vigilance or of the White Falcon of the House of Saxe-Weimar, founded 2 Aug. 1732 by Duke Ernest Augustus; a Medal of Honor for great achievements during the war of 1870–1, founded 19 July 1871, by Grand Duke Charles Alexander; a Medal of Merit, with sword, and medals of recognition of the arts and sciences, founded by Grand Duke Charles Alexander, 25 Aug. 1892; a Medal for Life-saving, founded 24 June 1881; a Medal of Honor for Firemen, founded 22 Nov. 1890; a Distinction for non-commissioned officers and soldiers, created 9 March 1872, and a Medal of Honor for women, founded by Grand Duke Charles Alexander 30 Dec. 1900. (The Duchy) The Order of the House of Ernestine was created in 1691 by Duke Frederick I. of Saxe-Gotha-Altenburg, under the name of "The Order of German Integrity." It is the reward of high ducal functionaries and its qualifications are chiefly administrative and executive service.

Saxe-Altenburg.—A medal for arts and sciences, founded by Duke Ernest in 1871.

Saxe-Coburg and Gotha.— A Cross and Medal of Merit for the arts and sciences, founded 27 Jan. 1869; a medal for Life-saving, founded 1 May 1883; the Medal of Duke Ernest, founded 27 Feb. 1888; the Medal of Duke Alfred, founded 1 Jan. 1896, and the Medal commemorative of the silver wedding of Duke Alfred, created 23 Jan. 1890.

Saxe-Meiningen.—A Cross of Merit and a Medal of Merit for the arts and sciences, created by Duke George 25 July 1874.

Schwarzburg-Rudolstadt.—Two medals of merit, each of two classes, created by Duke Gonthier 8 Feb. 1899.

Schwarzburg-Sondershausen.—A medal for life-saving, created in 1868; a Medal of Honor for Firemen, created 11 June 1895, and a Medal of Honor for servants and workmen who have completed 40 years of active service in the same house or with the same establishment, founded by Prince Charles Gonthier 20 Oct. 1896.

Schwarzburg-Rudolstadt-Sonderhausen.— The Cross

of Honor of Schwarzburg was created 20 May 1853 by Prince Frederick Gontmer for the Principality of Schwarzburg-Rudolstadt and was changed, 28 May 1857, to include both principalities of Schwarzburg.

Waldeck.—The Order of Civil Merit was founded 3 July 1857 by Prince George Victor; the Cross of Military Merit for officers was created 14 June 1854, and the Cross of Honor and Medal for the arts and sciences was founded in 1899.

Würtemberg.—The Order of the Crown of Würtemberg, which confers personal nobility upon civilians, was created by King William I. 23 Sept. 1818 by the union of two older orders, the Order of the Eagle and the Order of Civil Merit, instituted by Frederick I. in 1806; the Military Order of Frederick was founded 1 Jan. 1830 by King William I., the Order of Military Merit was created by Duke Charles Eugene 6 Nov. 1806. The Order of Olga, for ladies, was created by King Charles X. 27 June 1871, in honor of his queen, and the Medal of Charles-Olga, founded by Queen Olga in 1889, was merged in the Order of Olga in 1893, making the decoration apply to both sexes. A Medal of Merit (1892), a Military Medal, a Medal for Life-saving (1897), and a Cross of Merit (1900) are also conferred.

GREAT BRITAIN.—The English order of highest distinction is, of course, the Order of the Garter, a decoration which owes its origin to King Edward III., who is said to have founded it about 1350. While this is a matter of record, however, all other facts in regard to the institution of the Order are "wrapped in mystery," and it will never be known decisively whether King Edward's desire was to revive the glories of the Round Table, to justify his claim to the throne of France, to commemorate the victory of the Black Prince at Crécy, or to bruit abroad his devotion to a lady. Edward himself announced that the Order was founded in honor of the Holy Trinity, the Virgin Mary, Saint George of Cappadocia, and Saint Edward the Confessor, and he instructed his Knights Companions to wear the Garter at all times, to be present at Windsor each Saint George's Eve in order to make offerings of prayers and money in the chapel; on the following day to participate in the annual festival, and, for certain days thereafter, to be ready to meet all worthy comers in the lists for the honor of the Order and the glory of its patrons. The Order of Saint John of Jerusalem was introduced into England during the 12th century, or about 1330. When the Order was divided into seven languages England received the sixth place, but the organization received comparatively little attention until 1830, when it was revived and, in 1888, it was again reorganized, this time under a royal charter. The Order of the Bath, which was founded by King Henry IV. in 1399 as a distinction for civil and military services, is also one of Great Britain's proudest orders. It owes its peculiar name to the fact that in olden times the taking of a bath constituted one of the most important features of the investiture of the knights. The Order of the Thistle, otherwise known as the Order of Saint Andrew, which is bestowed only upon Scottish peers, claims to have originated in the year 787; in 1687 it was re-established by King James VII. of Scotland (James II. of England). The Order of Saint Patrick is to Ireland what the Thistle is to Scotland, and included in its membership the leading Irish peers. It was founded 5 Feb. 1783 by King George III. The Order of Saint Michael and Saint George is of even more recent origin and has generally been identified with the colonial interests of Great Britain. It was founded by King George III. 27 April 1818. Other British Orders and decorations are: The Order of the Star of India, founded by Queen Victoria 23 Feb. 1861; the Order of the Indian Empire, founded by Queen Victoria 1 Jan. 1878; the Distinguished Service Order, for the reward of individual instances of meritorious service in war, was founded by Queen Victoria 6 Sept. 1886; the Victoria Cross, for distinguished service in war, founded by Queen Victoria 29 Jan. 1856; the Albert Medal, founded 7 May 1886; the Royal Order of Victoria, founded by Queen Victoria, for personal services rendered, 23 April 1896; the Royal Order of Victoria and Albert, founded by Queen Victoria, for women, 10 Feb. 1862; the Imperial Order of the Crown of India, founded by Queen Victoria, as a recognition of the services of women nurses, 31 Dec. 1877; the Order of the Red Cross, for women only, founded by Queen Victoria 23 April 1883, and the Cross of Merit, for distinguished services rendered in time of war, founded by King Edward VII. 15 June 1901. The Military Order and Order of Merit of British India was instituted in 1837 to reward meritorious service in the native army of India. The decoration is of two classes, one carrying the title of "Sirdar Bahadur," and the other that of "Bahadur."

GREECE.—The only order bestowed by Greece is the Royal Order of the Saviour, or of the Redeemer, which was founded by the General Assembly of the Hellenes, in commemoration of the deliverance of Greece, 12 Aug. 1829. It is conferred for all kinds of distinctions.

HAITI.—The two Haitian Orders, which are no longer conferred, are the Order of Saint Faustin, founded by President Soulouque in 1852, and the Order of the Legion of Honor.

HANOVER.—The Orders of Hanover, which are no longer conferred, are: The Order of Saint George, founded and declared the Order of the House of Hanover by King Ernest Augustus 23 April 1839; the Order of the Guelphs, created 12 Aug. 1815 by Prince George, afterward King George IV.; the Order of Ernest Augustus, founded 15 Dec. 1865 by King George V.; a medal for the arts and sciences, founded 30 April 1843, and a Medal of Merit for life-saving, founded 8 Aug. 1845 by King Ernest Augustus.

HAWAII.—The Hawaiian Orders, which are no longer conferred, are: The Order of Kamehameha I., instituted 11 April 1865; the Order of Kalakaua I., founded 12 Feb. 1875; the Order of the Royal Crown of Hawaii, instituted 12 Sept. 1882; an Order and a Medal of Kapiolani, created 30 Aug. 1880, and the Order of the Star of the Ocean, founded 16 Dec. 1886.

HONDURAS.—The chivalric Order of Saint Rose and of the Civilization of Honduras, which was created by President Medina 21 Feb. 1868 is no longer conferred.

ITALY.—The Order of the Annunziata, which ranks third in the list of orders, consists of but one grade, which, it is claimed, was created by Amadeus VI. of Savoy 1362, in commemoration of the exploits of his predecessor, Amadeus V., at Rhodes. It was revived 11 Sept. 1815 by Charles III. and was again modified by Victor Emmanuel II. who, in 1869, restricted the number of knights to 20 in addition to the sovereign, the princes, and some others. The Order of Saint Maurice and Saint Lazare was formed as the result of a union of two orders, the Order of Saint Maurice, which was founded by Count Amadeus VIII. in 1434, and the Order of Saint Lazare, which claimed to have been instituted in Jerusalem in the latter part of the 10th century. The union was renewed 27 Dec. 1816 by Victor Emmanuel, who decreed new statutes and withdrew the limit upon the number of knights. Other Italian orders are: The Military Order of Savoy, founded 14 Aug. 1815 by King Victor Emmanuel; the Civil Order of Savoy, founded 29 Oct. 1831 by King Charles Albert of Sardinia; the Order of the Crown of Italy, founded 20 Feb. 1868 by King Victor Emmanuel II., and the Order of Agricultural Merit, founded 9 May 1901 by King Victor Emmanuel III.

JAPAN.—Japan has several orders, all of recent origin: The Supreme Order of the Chrysanthemum, which is worn by the Mikado himself and is conferred almost exclusively upon foreign sovereigns and princes of the blood, was founded by Emperor Mutsuhito 27 Dec. 1877. The less important Japanese orders are: The Order of the Sun of Paullownia, founded 1 Jan. 1888; the Order of the Eastern Sun, founded by Emperor Mutsuhito 10 April 1875; the Military Order of the Golden Kite, founded 11 Feb. 1890; the Order of the Sacred Treasure, founded 3 Jan. 1888; the Order of the Crown, for women, also created 3 Jan. 1888, and the Medal for Life-saving, founded 7 Dec. 1881.

KONGO INDEPENDENT STATES.—The Kongo Independent States confers three orders and one medal for service, all of which were instituted by Leopold II., King of the Belgians. These are: The Order of the African Star, founded 30 Dec. 1888; the Order of the Royal Lion, founded 9 April 1891; the Order of the Crown, founded 15 Oct. 1897, and the Star of Service of the Kongo Independent States, created 16 Jan. 1889.

KOREA.—Korea possesses five orders, three of which, the Order of the Golden Rule (Keum Ch'ok), the Order of the Plum Blossom (Li Hoa), and the Order of the National Flag (Tai Keuk), were founded by Royal decree 17 April 1900. The Order of the Purple Falcon (Cha Eung), for military service, and the Order of the Eight Elements (Pai Koai), founded 16 April 1901, are the other decorations.

LIBERIA.—The Order of the Beneficence of Liberia of the African Redemption was founded by the Legislative Corps of the Republic 13 Jan. 1879. Other Liberian decorations are: The Gold Medal of the Lone Star, and the Order of Merit, bestowed for service in the civilization of Africa.

LUCCA.—The following orders formerly bestowed by the Duchy of Lucca are no longer conferred: The Order of Saint George, for military merit, founded by Duke Charles Louis 7 May 1841, and the Order of Merit of Saint Louis, created by Duke Charles Louis 22 Dec. 1836.

LUXEMBURG.— The Order of the Golden Lion of the House of Nassau was founded in common by Duke Adolph of Nassau and King William III. of The Netherlands 16 March 1858. The Order of the Oaken Crown, conferred upon all classes, was founded by Grand Duke William II. 29 Dec. 1849. There is also an Order of Civil and Military Merit, founded by Duke Adolph of Nassau 8 May 1858. Its decorations include a Cross of Merit and medals for the arts and sciences.

MADRID.— Don Carlos of Madrid, pretender to the throne of Spain, bestows the Order of Charity upon his adherents, but the decoration is recognized by none of the authorities.

MEXICO.—The Mexican Orders, which are no longer conferred, are: The Order of Our Lady of Guadalupe, founded in 1852; the Order of the Mexican Eagle, founded by Emperor Maximilian 1 Jan. 1865; a Medal for Bravery, and the Order of Saint Charles, for women, founded by Emperor Maximilian 10 April 1865.

MODENA.—The Order of the Eagle of Este, which was founded in 1855 by Duke Francis V., is no longer conferred.

MONACO.— Only one order is conferred by the reigning Prince of Monaco, the Order of Saint Charles, which was founded by Prince Charles III. 15 March 1858.

MONTENEGRO.— The decorations conferred by the reigning Prince of Montenegro are: The Order of Independence, founded by Prince Danilo 5 May 1855, and reorganized by Prince Nicolas I.; the Order of Saint Peter, founded in 1852; the Military Medal of Obilith, for bravery, founded in 1851; a gold Medal for Bravery, founded by Peter II. in 1841, and a Medal of Devotion, for patriotic service, founded by Prince Nicholas in 1895.

NETHERLANDS, THE.—The Order of William, founded by King William 30 April 1815, is a reward for conspicuous military service, while the Order of the Netherlands Lion, founded by King William 29 Sept. 1815, is a recompense for civil merit. The Order of Orange-Nassau was created by Queen Regent Emma, in the name of Queen Wilhelmina 4 April 1892. The sovereign of The Netherlands also bestows the decorations of the Teutonic Order, the Commandery of Utrecht, which was abolished by Napoleon, having been re-established by King William in 1815, as well as the Order of the Golden Lion, the family Order of the House of Nassau.

NICARAGUA.—The Order of Saint John of Nicaragua, founded by the Government of the Republic 1 May 1857, is no longer conferred.

PARAGUAY.— The Order of Merit was founded in 1864 by Lopez II.

PARMA.—The Order of Merit of Saint Louis, founded by Charles II. 22 Dec. 1836, is no longer conferred.

PERSIA.—The orders conferred by the Shah of Persia are: The Order of the Sun and the Lion (Nishane Shir va Khurshid), founded by Fath Ali Shah in 1808; the Order of the Sun, for women (Nishane-Aftab), founded by Nasr-ed-Din Shah 1873, and a Medal for the arts and sciences (Nishane ilmi), founded in 1851.

PERU.—The Cordon of Honor, founded 15 June 1866.

PORTUGAL.— Portugal possesses several orders of consequence, some of them being of great antiquity. The Military Order of Saint Benedict of Aviz was founded in 1158 under the name of the "Order of Calatrave"; was extended by Alfonso Henriques 13 Aug. 1162; was transferred to Aviz in 1187, and was changed to an order of military merit, under its present title 10 June 1789. The Order of Saint James of the Sword was founded in Spain in 1175, and was introduced into Portugal by Alfonso Henriques in 1290. On 31 Oct. 1862 it was changed to an Order for the arts, science, and literature by Louis I. The Order of the Tower and Sword was created by Alphonse V. in 1459 and was reorganized as an order for bravery, loyalty, and merit 28 July 1832. The Order of Our Lady of the Conception of Villa-Viciosa was founded, as an order for both sexes, by John VI. of Portugal and Brazil 10 Sept. 1819. The Order of Saint Isabelle, for women, was founded by the Prince Regent, John, 4 Nov. 1801, and the Civil Order for agricultural and industrial merit was created by King Carlos 4 June 1893. Portugal also confers the decoration of the Order of Christ, a military order that was founded, on the ruins of the abolished Order of the Temple, 14 Aug. 1318. Its membership is restricted to Roman Catholics of noble birth.

PONTIFICAL.— Several orders of importance are still conferred by the Holy See. The doubtful Order of the Golden Spur, now the Order of Saint Sylvester, claims greater antiquity than any other Knightly Order on the presumption that it was instituted by Constantine the Great and confirmed by Saint Sylvester. Many reliable authorities, however, attribute its origin to Pope Pius IV. in 1559. On 31 Oct. 1841 Pope Gregory XVI. decreed new statutes restricting its applications to zeal in the cause of the church and civil virtues and dividing it into two classes, Commanders and Knights. The Order of the Holy Sepulchre, which is attributed to Pope Alexander VI. and Godfrey of Bouillon was created with about the same motives as the Order of Saint John of Jerusalem. It was confirmed by Pope Benedict XIV. in 1746, and the decorations of its three classes are now conferred in the name of the Holy See by the Latin Patriarch at Jerusalem. The Order of Christ as conferred at Rome closely resembles the Portuguese order of the same name. In Rome, however, noble birth is not a requisite to admission. Other Pontifical orders are: The Order of Pius IX., founded by Pope Pius IX. 17 June 1847; the Order of Saint Gregory the Great, founded by Gregory XVI. 1 Sept. 1831; the Order of the Moor, an art distinction, founded by Pope Pius VII. 23 Sept. 1806; and the Order of Saint Cecilia, a musical distinction, founded 17 June 1847. The Golden Rose is sent occasionally to high dignitaries, and sometimes to cities or churches, in recognition of high type of character. It originated in the 13th century, and of late it has been bestowed chiefly upon women of royal blood.

RUMANIA.—The Rumanian decorations are necessarily extremely modern. The Order of the Star of Rumania (Steaua Romaniei) was created 22 May 1877 by Prince Charles, and the Order of the Crown of Rumania (Coroana Romaniei) was instituted by the same ruler 14 March 1881. Other Rumanian decorations are: A Medal of Military Virtue, instituted 29 May 1872; a Medal for Merit acquired in the arts and sciences, instituted 4 March 1876, and a Medal for faithful service, instituted 20 April 1878, all founded by Prince Charles.

RUSSIA.—Although the Russian orders are very modern when compared with those of other countries the bestowal of any one of them confers nobility. The Order of Saint Andrew, patron saint of Russia, is the oldest and highest decoration conferred by the Czar. It was founded 11 Dec. 1698 by Czar Peter I. Other decorations are: The Order of Saint Catherine, for women, founded 24 Nov. 1714 by Czar Peter I.; the Order of Saint Alexander-Nevski was created by Empress Catherine I. 21 May 1725; the Military Order of Saint George, created by Empress Catherine II. 7 Dec. 1769; the Order of Saint Vladimir, bestowed upon Russian subjects and foreigners in the active service of the state, founded by Empress Catherine II. 4 Oct. 1782; the Order of Saint Anne, created by Charles Frederick, Duke of Schleswig-Holstein Gottrop, in 1735, in memory of Empress Anne, and adopted as a Russian order by Emperor Paul I. 5 April 1797; and the Honorary Distinction of the Red Cross, instituted in 1899 by Emperor Nicholas II. The three Polish decorations, the Order of the White Eagle, supposed to have been founded in 1325 by Vladislas V., King of Poland; the Order of Saint Stanislas, instituted 7 May 1765 by Stanislas Augustus Poniatowski, King of Poland, and the Order of Military Merit, instituted by the same ruler in 1792, were adopted as Imperial Orders of Russia in 1831. The minor decorations of Russia are medals commemorative of the reigns of Emperor Alexander III., Emperor Nicholas I., and several important events in the history of the empire, all of which were instituted by Emperor Nicholas II.

SAN MARINO.—The chivalric Order of San Marino was founded by the Sovereign Grand Council of the Republic 15 March 1860.

SERVIA.—The Servian orders are: The Order of Saint Lazare, which is worn by the King; the Order of the White Eagle, commemorative of the re-establishment of the kingdom and conferred for personal services to king or country, founded 23 Jan. 1883 by King Milan I.; the Order of the Cross of Takovo, for services in the cause of Servian independence, founded by Prince Michel Obrenovitch III. 22 May 1865; the Order of Saint Sava, for services in behalf of the Church, of education or of literature, founded by King Milan I. 4 Feb. 1883, and the Order of Miloch the Great, founded by King Alexander I. 29 Dec. 1898. As the latter order was bestowed for distinguished services in behalf of the Obrenovitch Dynasty it is, of course, no longer conferred.

SIAM.—The religious Order of the Nine-Pointed Star, bestowed only upon Buddhists, was instituted 29 Dec. 1869; the Order of the Great Crown (Maha Chakri), conferred only upon sovereigns and princes and princesses, was founded 21 Sept. 1884; the Order of the White Elephant of Siam (Moha-Wahra-Bohru), the highest national order, was instituted in 1861; the Order of the Siamese Crown (Mongkut-Siam), was founded 29 Dec. 1869; the Order of Chulachonclao, otherwise known as the Sacred Order which contains a

portrait of the king, is conferred only upon natives. It was founded 16 Nov. 1873. The only minor decoration bestowed by Siam is a medal for servants and artists, in two classes, instituted 10 Sept. 1887.

SICILY, or THE TWO SICILIES.—The following orders of the Two Sicilies are no longer conferred: The Order of Saint Ferdinand and of Merit, founded 1 April 1800 by King Ferdinand IV.; the Order of Saint Janvier, founded by King Charles III. 6 July 1738; the Royal Order of Constantine, said to have been instituted by the Emperor Constantine and reorganized in 1191 by Emperor Isaac Ange Comnene; the Royal and Military Order of Saint George of the Reunion, founded by Joseph Bonaparte, King of Naples, 24 Feb. 1808; the Order of Francis I., created by King Francis I. 28 Sept. 1829, and the Order of the Two Sicilies founded by King Joseph Bonaparte 24 Feb. 1808.

SPAIN.— In addition to the Golden Fleece (see *Austria*) and the Military Order of Malta, which is the Spanish branch of the Order of Saint John of Jerusalem, Spain possesses several important and ancient decorations. The Military Order of Calatrava was founded by King Sancho III. in 1158 to commemorate the recovery of that town from the Moors, a victory won in 1147. In 1523 King Charles V. vested the grand membership of this Order, as well as that of the Orders of Alcantara (founded in 1156) and Saint James (confirmed in 1175) in the crown of Spain. They are now purely military. The Military Order of Saint Ferdinand was founded by royal decree 31 Aug. 1811, and is bestowed upon subaltern officers and soldiers for bravery. The Military Order of Our Lady of Montesa was created 22 July 1319 by James II., King of Aragon and Valencia. Other Spanish Orders are: The Military Order of Saint Hermenegilde, instituted 28 Nov. 1814 by King Ferdinand VII.; the Royal American Order of Isabella the Catholic, for the defense of the American possessions, founded by King Ferdinand VII. 24 March 1815; the Order of Isabelle II., for officers below the rank of "Chef de Battallon," founded by King Ferdinand VII. 19 June 1833; the Illustrious Royal Order of Charles III., instituted by King Charles III. 19 Sept. 1771; the Order of Military Merit, founded 3 Aug. 1864; the Order of Naval Merit, founded 3 Aug. 1866; the Order of Marie-Victoria, founded by King Amadeus 7 July 1871; the Order of the Beneficencia, for humane and useful public service, was created by Queen Isabelle II. 17 May 1856; the Military Order of Marie-Christine, founded in 1890, and the Order of Marie-Louise, for women only, instituted by Marie Louise, wife of Charles IV., 21 April 1792.

SWEDEN AND NORWAY.— Sweden has the distinction of possessing the only Masonic Order in the world, the Order of Charles XIII., which was founded by King Charles XIII. 27 May 1811, being bestowed only upon Freemasons. The Order of the Seraphim, or the Blue Ribbon, is of great antiquity, having been instituted at least as early as 1285. It was revived in 1748 by Frederick I., who specified that no one beneath the rank of lieutenant-general should be admitted to membership. The Order of the Sword, or the Yellow Ribbon, is supposed to have been founded by Gustavus Vasa, in 1522. On 28 April 1748 it was reorganized by Frederick I. The Order of the Pole Star, or the Black Ribbon, was founded by Frederick I. 28 April 1748, as a reward for civil merit. The Order of Vasa, or the Green Ribbon, was created by King Gustavus III. 26 May 1772. The only Norwegian Order is that of Saint Olaf, which may be bestowed, for special merit, upon all classes. The Order was founded by King Oscar I., 21 Aug. 1847, in commemoration of the deeds of Saint Olaf, who freed the land from Denmark in the 11th century.

TURKEY.—The most important Turkish Orders are: The imperial Order of the Medjidie, for faithful service for the state, founded in August 1851 by Sultan Abdul Medjid; the Nishan-i-Shefkat, instituted in 1878 by Sultan Abdul Hamid II., in honor of the "Turkish Compassionate Fund" of 1877, and bestowed only upon women, and the Imperial Order of the Osmanie, established for distinguished civil or military services by Sultan Abdul Aziz 4 Jan. 1862. Other Turkish Orders are: The Order of Hanedani-Ali-Osman, conferred only upon members of the Imperial family, founded by Sultan Abdul Hamid II. in 1895; the Order of Merit (Nishan-i-Imtiaz), created 21 Sept. 1879, by Sultan Hamid II.; the Order of Glory Nishan-i-Iftikhar), founded 19 Aug. 1831, by Sultan Mahmud II.; the Medal of Merit (Liakat), founded 1561, by Duke Como de' Medicis; the Order of Merit of Honor (Iftikhar), founded in 1856 by Sultan Abdul Medjid.

TUSCANY.—The Tuscan Orders, no longer conferred, are: The Military and Ecclesiastical Order of Saint Stephen, Pope and Martyr, founded 15 March 1561, by Duke Como de' Medici; the Order of Merit of Saint Joseph, founded in 1514; the Order of the White Cross, founded in 1814, and the Order of Military Merit, founded 19 Dec. 1853, by Grand Duke Leopoid II.

VENEZUELA.—The Order of the Bust of the Liberator, otherwise known as the Order of Bolivar, was created by the Congress of Peru 12 Feb. 1825, and accepted by President Monagas of Venezuela, 11 March 1854. The Order of Merit was founded by President Paez, 29 Aug. 1861, and the Medal of Public Instruction was founded by Guzman Blanco.

ZANZIBAR.— Zanzibar's single decoration is the Order of the Jeweled Star, founded by Sultan Bargasch Ben Seid 22 Dec. 1875.

JOHN R. MEADER,
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Or'dinal, that portion of the Anglican Book of Common Prayer (see PRAYER BOOK) which contains the offices for the consecration of bishops and the ordination of priests and deacons. So far it corresponds with certain offices in the Pontifical (q.v.) of the Roman Catholic Church.

Or'dinance of 1787, in American history, an act of Congress passed in July 1787, to regulate the government of the western lands granted to the Ohio Company. The ordinance has been called "the most notable law ever enacted by the representatives of the American people." It marks the beginning of one of the most remarkable growths ever known in territorial expansion, and it has furnished the bases for the constitutions of several States. It is especially noted for three great provisions of all good government,— its guaranty of entire freedom of worship,— its perpetual prohibition of human slavery,— and the great prominence given to the matter of schools and education in the words "Religion, morality, and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged." Three more important principles could hardly be found in any law. The "Ordinance of 1787" is more than a mere law passed by Congress, which might be changed or repealed. It does not say "Be it enacted," but it says "Be it ordained by the United States in Congress assembled that said territory, for the purposes of temporary government, be one district, subject, however, to be divided into two districts, as future circumstances may, in the opinion of Congress, make it expedient." This declaration constitutes the first section of this great state paper, and it is followed by 13 other sections, making 14 in all, the first 12 of which provide for the management of affairs under a temporary government of the Northwest Territory. After providing for temporary government, the great purpose of this remarkable state paper is set forth in plain but unmistakable terms, when it says,

> And, for extending the fundamental principles of civil and religious liberty, which form the basis whereon these republics, their laws and constitutions, are erected to fix and establish these principles as the basis of all laws, constitutions, and governments, which forever hereafter shall be formed in said territory to provide also for the establishment of states, and permanent government therein, and for their admission to a share in the federal councils on an equal footing with the original states, at as early periods as may be consistent with the general interest:—It is hereby ordained and declared by the authority aforesaid (United States), That the articles shall be considered as articles of compact between the original states and the people and states in the said territory and forever remain unalterable, unless by common consent.

The articles referred to are six in number, and form a definite compact between the United

States as it then existed, and the people of the Northwest Territory and the States that might afterwards be formed from it.

Ordina'tion, the ceremony by which bishops, priests and deacons, candidates for the minor orders and ministers of any denomination are admitted to their specific office in the church. The Roman Catholic doctrine of ordination is confirmed by John xx. 21, 22, and the power of ordination is believed to be descended from the apostles through the bishops. Ordination is reckoned one of the seven sacraments. Orders in the Roman Catholic Church are normally conferred by bishops and the higher orders can be conferred by no other functionary. Holy orders are conferred normally on the Saturdays in any of the four Ember weeks, on the fifth Saturday in Lent, on Holy Saturday; but two grades cannot be conferred the same day on the same person. A bishop is normally ordained on a Sunday or on the festival of an apostle. The English Church also considers ordination as a real consecration, the power of communicating which has descended from Christ through the apostles and bishops (see APOSTOLIC SUCCESSION). There is, however, a diversity of opinion on this point, the high-church party maintaining the dogma, the broad and some of the low church party denying it. For ordination in the English Church, subscription to the 39 articles and the declaration that the Book of Common Prayer contains nothing contrary to Scripture, are required. The ceremony of ordination is performed by the bishop with the imposition of hands on the person to be ordained. In the English Church ordination is a requisite to the exercise of a ministerial office; but in some denominations ordination is not necessary for that purpose. In the Presbyterian Church ordination means the act of settling or establishing a licensed preacher over a congregation with pastoral charge and authority, or the act of conferring on a licensed preacher the powers of a settled minister of the gospel without the charge of a particular church, but with general powers wherever he may be called upon to officiate. The Congregationalists believe that the call of a congregation gives ministerial authority to a preacher. In the Methodist Episcopal churches the form of ordination closely follows that of the Protestant Episcopal Church, with omission of every form of expression which may appear to favor sacerdotalism.

Ordnance (variant of ordinance, form Lat. *ordinare,* to order). The word owes its application to military machines to an ordinance of Henry VIII. of England, regulating the manufacture of cannon, and establishing a board charged with the care of the crown fortifications. In time, cannon manufactured according to the specifications of the decree came to be known as ordinance or ordnance. In its present usage, the term comprehends all machines designed to hurl projectiles of any kind, shape, or size, by the agency of explosives. More particularly, it is understood to refer to mounted cannon as distinguished from those pieces such as rifles, pistols, or other small arms usually held in the hand while being fired. Prior to the 14th century, ordnance consisted of a great variety of machines for hurling large and heavy missiles which were propelled by the reaction of a tightly twisted rope of hemp, catgut, or hair, or by the action of a lever and sling. Of the former, the most important and powerful were the ballista, catapult, scorpion, and the onager. They threw large stones and heavy arrows or darts; the catapults, especially, being credited with the power of throwing a missile a distance of half a mile. Of the sling machines, the trebuchet, mate-griffon, and the matefonda, throwing stones and small arrows, were the most effective and in general use. About the latter part of the 13th century, the arbalest, a small portable ballista, throwing shot and small arrows by the action of a bow string arrangement, came into general use. The string was pulled back to a state of tension either by the foot or a mechanical device worked by the hand. It was discharged while held against the shoulder, the propelling string being liberated by a trigger worked by the finger. The arbalest may be considered as the fore-runner of the modern musket and rifle, but the relation is wholly that of a similarity of purpose. In the ancient blow-gun, however, some analogy to the modern pneumatic gun is found, but the lesson taught is not of much importance.

Early in the 14th century the first arms and machines employing gunpowder as the propelling agency came into use, gradually replacing with gunpowder cannon all of the earlier types of ordnance. The exact date upon which they were first used is not known. Cannon called "crakys of war" were used by the English against the Scots in 1327, and by the French against the Flemish in 1338. They were made of bars arranged like the staves of a barrel, which were bound together by iron hoops and wrappings to give the necessary strength. They were very short and thick, and wide in the bore. They resembled bowls or mortars, the latter term being applied even at the present time to a particular type of ordnance. They hurled stone projectiles with slow velocity and little accuracy of aim. At first their effectiveness was not as great as that of the catapults either in accuracy or power, but later, improvements in shape and mountings and longer cylindrical bores, increased the accuracy of aim, while thicker walls with narrower powder chambers concentrated the powder gas, giving greater velocity to the projectiles. In the 15th century the use of cannon increased, great improvements being made in shape, size, and power. Bombards, culverins, and serpentines, with bores 20 to 25 inches in diameter, weighing over 18 tons, and throwing stone projectiles ranging in weight from 200 to 1,000 pounds, were sometimes used. The constructive effort, however, was not confined to the larger types. The arquebus, the first form of hand gun or small arm which may be compared fairly with the modern musket or rifle, was invented about the earlier part of the century. In the first forms the match was applied to the touch-hole by the hand, but in 1476 a contrivance suggested by the trigger of the mediæval arbalest was employed for that purpose with greater speed and certainty.

About this time the method of casting replaced that of bars and hoops in the construction of large ordnance, introducing bronze and brass as materials. Great improvements were made in mountings; trunnions were introduced, and carriages were employed to facilitate transportation with troops. The most marked ad-

vances in these matters were made by France from 1460 to 1482. Stone projectiles were replaced by cast-iron shot with increased range and effect, but their greater density required greater propelling pressures and caused a reduction in calibre (the diameter of the bore) and a corresponding increase in the thickness of the walls of the tubes. Therefore the guns manufactured during the latter part of this century were of better workmanship, lighter weight, and greater power. The first cast guns were cast hollow, but in 1749 the French discovered a method of boring guns cast solid which gave improved shape of bore, but without any material gain in strength, as was subsequently demonstrated by the Rodman system of construction. Although the 16th century did not witness any great advance in artillery science, the manufacture of ordnance grew to greater proportions, while methods were carefully studied and practically developed to obtain the greatest efficiency. The requirement of mobility caused a return from cast-iron to the lighter brass; improvements such as handles and cascabels for operative purposes were introduced; while case-shot and shells occasionally replaced solid projectiles. Upon the assumption that the range increased indefinitely with the length of the piece, guns were made of extreme length, often equaling 50 or 60 calibres. This tendency, however, was checked by the condition that shell fuses had to be lighted before insertion, and caused many premature explosions. The opposite extreme was reached by the Dutch who designed the howitzer, a piece so reduced in length that a shell could be put into it by the hand. The greatest advances, however, were made by Gustavus Adolphus of Sweden. Recognizing the necessity for the mobility of field artillery, he introduced the "kalter" or leather guns. They were cylinders of thin beaten copper screwed into a brass breach-piece, the chamber of which was strengthened by iron hoops. These guns were of comparatively little strength and could bear but light charges; the great requirement, mobility, however, was obtained. Guns heavier than 12-pounders were excluded from field use, the most effective for that purpose being the 4-pounders weighing 5¼ hundredweight and drawn by two horses. Loading was facilitated by the use of cartridges made of paper or canvas and gave greater rapidity of fire.

In the 18th century the manufacture of ordnance made rapid progress, especially on ballistic matters. Hollow projectiles were introduced, and "grape," consisting of a number of tarred lead balls held together in a net, was employed. About this time (1765) the influence of General Gribeauval, of the French Army, began to be felt in the construction and use of ordnance. Canister, consisting of a number of small shot held in a thin can, and dispersed by the breakage of the can upon discharge, invented by him, replaced grape with more satisfactory results. He inaugurated great reforms in artillery science and built up very complete and distinctive systems for field, siege, garrison, and coast ordnance. Realizing the full value of mobility for field ordnance, and the necessity of better operating facilities for the other types, he reduced the size of the guns, decreased the charge, and reduced the windage. Carriages were built on a uniform plan of combined wood and iron, all susceptible parts being made interchangeable. Draft was diminished by the increased height of the limber wheels; iron axle-trees, replaced those of wood, while verticle pin-tails on top of the limbers, and the substitution of poles for shafts, facilitated limbering and unlimbering. Traveling trunnion poles were introduced to distribute the weight of the piece over the four wheels; the horses were harnessed in pairs instead of tandem; and the prolong-rope was employed to unite the gun trail to the limber in slow retirement. For garrison ordnance, carriages with wheels in front and rear-trucks were used, while those of coast fortifications were mounted on traversing platforms pivoted in front, and with a truck in the rear running on a circular track. The system of uniformity of construction and interchangeability of parts was applied to the guns also, while their service was greatly improved by the adoption of cross-headed elevating screws and tangent scales, together with the use of fixed ammunition in which the powder, cartridge, and projectile were united.

Near the close of this century, short cast-iron guns called "carronades" were introduced by Gascoigne, of the Carron Iron Works (Scotland). They were lighter than the ordinary guns; had powder-chambers like mortars, and were especialy adapted for naval use. They were generally carried on the upper decks; were more easily handled and loaded than the longer guns, and threw heavy shots at low velocities, with great battering effect. The sailors, with whom they were great favorites, called them "smashers." They were very effective in the close engagements of their time, but are not represented by any type of modern ordnance; the present demand being for high-power guns developing high velocities for projectiles, with great powers of penetration at long ranges.

About the beginning of the 19th century these requirements forced a return to guns with longer barrels and larger powder-chambers. Of this type, the "columbiad," invented by Colonel George Bomford (U. S. Army), did effective work in the War of 1812, and up to about 1860, when they were superseded by the Rodman guns. Abroad General Paixhans of the French Army developed the idea still farther and produced the "Paixhans gun," the extensive use of which, together with the columbiads, practically compelled the adoption of armor for ships. From the middle of this century, the construction of ordnance received a higher order of scientific thought and investigation. The requirements of high velocities and flat trajectories, without lightening the weight of the projectiles, formed the basis for all designs.

In 1856 Admiral Dahlgren (U. S. Navy), designed the "Dahlgren guns" with shapes proportioned to the "curve of pressures," heavy at the breech and light at the muzzle. They represented a distinct advance in power with the minimum of weight, and were especially adapted for naval use. On the other hand, higher velocities required the development of greater pressures, which soon grew to such proportions that they exceeded the power of resistance represented by the tensile strength of cast iron. Another inherent weakness of castings was due

to the fact that they cooled from the outside inwardly, thus placing the inside metal in a state of tension and the outside in a state of compression. To obviate this condition Gen. Rodman, Chief of Ordnance, U. S. Army, suggested the casting of guns hollow and cooling them from the inside outwardly, by circulating a stream of cold water in the bore while the outside surface was kept at a high temperature. This method placed the metal inside in a state of compression and that on the outside in a state of tension — the proper condition to successfully withstand the pressure of the powder gas, which tends to expand the inner portions beyond the normal diameter and throw the strain on the supporting outer layers.

This system was universally employed and gave the best results obtainable from cast iron for many years, and was only superseded by that of «built up» guns, when iron and steel were made available by improved processes of production. The first built-up guns were made by Chambers and Treadwell (Americans), and Blakely of England. They made guns consisting of wrought-iron tubes with strengthening hoops shrunk on under initial tension; but Sir William Armstrong of England was the first to successfully produce guns, in which the principle of initial tension extended to all parts of the piece. Recognizing that wrought-iron bars were twice as strong in the direction of the fibre than across, he made hoops by winding rectangular bars around a mandrel into helical coils which were subsequently welded together. These hoops were expanded by heat and shrunk on over the inner tube and over each other, so that the inner tube and hoops were placed in a state of compression and the outer hoops under initial tension. It is clear that the most effective gun of this character would consist of a large number of very thin hoops shrunk on over each with such initial tensions that all of them would be equally strained by the discharge. An approximation to this condition was first made by Longridge of England, who produced a gun consisting of a steel tube wound around with steel wire under tension. The method was farther developed by Woodbridge in 1872, who recommended a thin steel tube wrapped with wire which was subsequently brazed together with melted bronze; and by Crozier in 1889, who employed a forged steel tube compressed beyond its natural elastic limit before being wound with square tinned steel wire under tension. The wire-wound system, although possessing a great deal of ingenuity, fails to give longitudinal strength. Perhaps the best representative of the system is the Brown segmental tubular wire-wound gun. It was of 5-inch calibre, and consisted of a thin steel tube of high elastic limit which formed the interior of the breech and extended a little beyond the base of the projectile, while the main tube, consisting of longitudinal steel bars, extended the full length of the piece, and was entirely wound with wire at such a tension that even under maximum pressure the tube was in a state of compression. While this condition was necessary to prevent the separation of the joints it possessed the undesirable feature of using a tube under an initial compression beyond a natural elastic limit. Although wire-wound guns of considerable size were made, some weighing as much as 23 tons and throwing a projectile of 600 pounds with fair velocity, the inherent weakness of the guns to withstand longitudinal strains will, in all probability, prevent much farther development of the system. The application of rifling to heavy ordnance, and the adoption of steel as the best material to withstand the enormous pressures developed in rifled guns, followed each other closely and firmly established the «built up» system as the best for the construction of heavy ordnance. It was not carried to its highest development, however, until the large stocks of smooth-bores owned by the various nations had been temporarily utilized in the form of converted rifles. In 1860 Parsons, of the United States, suggested the method of converting smooth-bores into rifles by inserting a rifled steel tube through the breech, the rear end of which was finally closed by a permanent screw plug. The forward movement of the tube was prevented by shoulders at several points. In 1863 Sir W. Palliser, of England, brought forward the method of inserting a coiled wrought-iron tube through the muzzle end, the forward movement of which was prevented by a collar fastened to the muzzle of the gun, and the tube subsequently rifled. The Palliser system, although not as effective as that of Parsons, was cheaper and was adopted in England and America, where, between 1874 and 1880, many 10-inch smooth-bores were thus converted into 8-inch rifles that compared favorably with rifles of original construction produced by other European powers at that time. The underlying principle of the Palliser method was subsequently applied to the original construction of guns, and together with that of the «built-up» system comprises the method employed in the manufacture of modern heavy ordnance, while the Parrott rifles and the Whitworth guns serve as connecting links between the application of rifling to and the adoption of steel as a material.

The Civil War in the United States created a demand for a quickly made rifle. The West Point Foundry (Parrott's) at Cold Springs, N. Y., supplied this demand with a gun consisting of a hollow cast-iron rifled tube, strengthened by a coiled wrought-iron hoop shrunk on the breech under initial tension. They were 100, 200, and 300 pounders, and rendered effective service, but the unreliable cast-iron component stood in the way of any farther application of the system.

From 1873 to 1890 attempts to construct large guns of steel, cast in one piece, were comparatively unsuccessful; while the method of expanding hoops by heat produced grave weaknesses in the guns constructed by the built up system. To eliminate these shortcomings, Sir J. Whitworth perfected a system of fluid-compression to improve steel ingots, and constructed guns by forcing steel hoops over a central tube and over each other by hydraulic pressure. Since 1890, however, the manufacture of steel ingots has progressed to such an extent, that first-class steel forgings weighing over 25 tons are now more readily produced than were those weighing three tons, 15 or 20 years ago. Improved methods of tempering and annealing have also removed weaknesses due to the expansion of hoops by heat for constructive purposes, so

that steel is now exclusively used in the manufacture of ordnance.

Classification.— The various forms of modern ordnance are classified and named according to size and weight; kind of projectiles used and their velocities; angle of elevation at which they are fired; use; and mode of operation.

Guns.— Now designated as "breech-loading rifles" (B. L. R.), to distinguish them from the obsolete smooth-bores and muzzle-loading rifles still in existence, are from 3 inches to 13 inches in calibre, from 12 to 39 feet in length, and from 1 to 70 tons in weight. They fire solid shot, or shells, weighing from 13 to 1,100 pounds, at high velocities (2,800 to 2,300 feet per second) and low elevation (about 12° max.). Their projectiles are capable of penetrating the best steel armor, from 2.3 to 19.4 inches in thickness, at the distance of 2,000 yards. The terms, field, siege, and sea-coast guns, indicate no essential differences in the guns themselves, but prescribe limits of weight according to the required mobility. For field use about the most effective size is that of the 3.2-inch breech-loading steel rifle; for siege purposes, that of the 5-inch siege mortars and guns; while the largest and heaviest types of ordnance are employed on the sea-coast fortifications.

Howitzers are shorter than guns of equal calibre, are fired at low velocities and higher angles, the maximum elevation being about 20°.

Mortars are still shorter, are fired at still lower velocities and higher elevations, ranging from 45° to 60°. They are used to throw shells over intervening obstructions against objects and into camps unreachable by gun fire at low elevations.

Rapid-fire guns are those in which the operation of opening and closing the breech is performed by a single motion of a lever actuated by the hand. They are charged with fixed ammunition, the projectile, explosive, and primer being contained in a single metallic case, so that loading also is done by one motion, and differentiates them from that class of ordnance in which the projectile, explosive, and primer are inserted separately. Up to within a short time the term "rapid-fire," in the United States, and "quick-fire," in England, implied similar qualifications, but now, in the United States Navy, a rapid-fire gun is officially defined as one in which a quick-working breech mechanism is operated by a single motion of a lever; in which fixed or separate ammunition may be used, but if the latter, prescribes a metallic case to hold the explosive; while a quick-fire gun is defined as one in which a quick-working breech mechanism is operated by one motion of a lever; is fitted with an automatic lock, and in loading uses a powder charge put up in a cartridge bag. These guns are made in various forms and are operated by several different systems of breech mechanism generally named after their respective inventors. Those best known are the Vickers-Maxim and the Armstrong, mostly used in England; the Canet, used in France and Russia; the Krupp in Germany; the Skoda and Krupp in Austria; the Bofors in the naval service of Norway and Sweden and of Denmark; while in the United States the Dashiel, Fletcher, Hotchkiss, Driggs-Schroeder, Maxim-Nordenfeldt, and Vickers-Maxim are used exclusively. The Nordenfeldt, one of the first designed, is not much used by any country. Rapid-fire guns vary in size from 1-pounders to 13.5-inch rifles, and in speed of fire from 60 rounds per minute, in the Vickers-Maxim 1-pounder, to 1 round in 2 minutes, in the 13.5-inch B. L. R. The speed of the smaller guns depends upon the drill of the crew, while that of the larger guns depends practically upon the mechanism of the mount. The accompanying table gives the best speed of fire of modern guns of various calibres:

Calibre	Number of rounds
1.4-in. 1 pounder, automatic	200 per minute.
1.8 " 3 " "	60 " "
2.24 " 6 " "	20 " "
3 " breech-loading rifle	17 " "
4 " " "	15 " "
5 " " "	12 " "
5.5 " " "	9 " "
6 " " "	9 " "
8 " " "	6 " "
8.3 " " "	3 " "
9.2 " " "	2-3 " "
10 " " "	1 " "
11 " " "	1 " "
12 " " "	1 in 1 min. 30 secs.
13 " " "	1 in 2 minutes.
13.5 " " "	1 in 2 minutes.

The development of rapid-fire guns practically dates from 1881, at which time the British Admiralty called for a gun not to exceed 1,120 pounds in weight, and capable of propelling a 6-pound projectile with a muzzle velocity of 1,800 feet per second, to use fixed ammunition, and to be served by not more than three men. About the same time the French authorities called for a three-pounder to fulfil similar conditions. Hotchkiss, an American, living in France at that time, responded by producing a series of one-, three-, and six-pounders, while Nordenfeldt brought out similar guns in England. These guns were intended for use against torpedo boats, and the calibres chosen were considered sufficiently large for that purpose, as the torpedo boats at that date were weak and slow, but the advent of swifter and stronger torpedo boats and destroyers, with their coal arrangement practically amounting to a protective armor, caused an increase in calibre, and quick-working breech mechanisms were soon applied to guns of all sizes up to and including the six-inch breech-loading rifles. At this point fixed ammunition became unwieldy, necessitating the separation of the projectile from the powder charge. This condition, however, has not reduced the speed of the larger guns, as the ammunition thus separated is easier handled. In the effort to satisfy the requirement of increased speed of fire a new type of the Vickers-Maxim was introduced in 1897, in which a quick-working breech mechanism automatically ejects the primer and draws up the loading tray into positon as the breech is opened. This system was quickly applied to the new guns of the United States Navy and materially increased the speed of fire in all calibres. That of the five-inch guns was especially improved and to them the system will probably be applied universally, while it is safe to state that the general improvement in the breech mechanisms of all guns during the last five years has more than doubled their speed of fire. A comparative

description of the Fletcher and Vickers-Maxim systems will be sufficient to give a general idea of these mechanisms. In the Fletcher, which is a development of the Farcot system, a worm-wheel on a vertical spindle works on a rack attached to the breech plug. To operate, the slotted-screw breech plug is first rotated by a crank to disengage the threads, then moved rearward and turned clear out of the breech. It is probably the simplest and strongest of all breech mechanisms. In the Vickers-Maxim a short arm driven from the vertical axis of the operating lever shifts its centre during the motion. In the six-pounders and smaller guns the Hotchkiss breech-block, consisting of a vertically sliding wedge, and the Driggs-Schroeder mechanism, in which the block is dropped to clear it from the housings of the breech and then revolved to the rear around a horizontal axis, are practically the only systems used.

Machine Guns are rapid-fire guns in which the speed of fire is such that it is practically continuous. Attempts to construct multiple-firing guns may be traced back to the earlier part of the 17th century. Small guns of Chinese manufacture have been found bearing dates as early as 1607. They are necessarily of crude construction and consist of two parallel barrels re-inforced at the breech ends with three hoops each of which has a vent, showing that the piece is arranged to fire three shots successively out of each barrel. From the middle of the 17th century to the middle of the 19th century, frequent efforts were made to produce rapid-firing guns, but with indifferent success. The introduction of fixed ammunition about 1860, however, contributed greatly toward their successful construction. During the Civil War in the United States, a great many forms of magazine and repeating rifles, pistols, and machine guns of a more or less effective character, were quickly produced, of which the «Gatling gun» was by far the best. It was invented by Dr. R. J. Gatling of Indianapolis in 1860 and assured for machine guns a permanent place in armaments. Machine guns may be more precisely defined as those in which the operations of loading, firing, and extracting the empty cartridge shells, are wholly or in part accomplished by mechanism. They are of three classes: (1) those operated by hand-power, electric-motor, or any other form of exterior force; (2) the semi-automatic, in which, although the energy of recoil is partially used to actuate the breech mechanism, each round of ammunition is inserted by the hand and the trigger is pressed for each discharge; (3) the automatic, in which the energy of recoil, or a part of the powder gas pressure at each discharge is fully utilized to operate the piece, which fires the rounds continuously while the trigger is pressed. To the first belong the Gatling and Gardner guns, the Nordenfeldt and the Hotchkiss revolving cannon.

The Gatling gun consists of a number (usually 10) of parallel barrels grouped around and secured firmly to a main central shaft, to which is also attached the grooved cartridge carrier and the lock cylinder. Each barrel is provided with its own lock or firing mechanism, independent of the others, but all of them revolve simultaneously with the barrels, carrier, and the inner breech, when the gun is in operation. The rotation of the gun gives a reciprocating motion to the locks, the forward and backward movement being effected by a cam actuated by the turning of the operating crank. In firing, one end of the feed case containing the cartridges is placed in the hopper on top and the operating crank turned. The cartridges drop one by one into the grooves of the carrier, and are loaded and fired by the forward motion of the locks, which also closes the breech, while the backward motion extracts and expels the empty shells. When first invented it was entirely different in principle and action from all other multiple-fire guns, admitting of faster discharges and heavier projectiles. It has passed through some stages of alteration and improvement, mainly in the arrangements for feeding the ammunition. At different elevations the original tin feed cases worked irregularly, so that the cartridges did not always fall into their proper positions in the grooves of the carrier, and jamming was of frequent occurrence. Various devices were designed to obviate this defect. The Bruce feed case, constructed on the gravity principle, overcame the defect of jamming, but not the irregularity of action at different angles of elevation, and was superseded by the Accles feed drum. This was a positive feeder, which rotating with the revolving barrels and lock cylinder, fed the cartridges with perfect regularity at any angle of elevation. It had, however, two serious drawbacks — its weight and the large amount of exposed surface, which if struck by a single bullet would at once put it out of action. In the latest method of feeding employed, the cartridges are attached to long strips of flexible metal and are fed into the openings in the hopper. As the gun is revolved by the operating crank, the projections in the grooves of the carrier act upon the cartridges and force the strips through the hopper, each cartridge being deposited in its proper position in the grooves of the carrier block and the empty strips thrown out to the right. In the latest forms an automatic traversing arrangement for scattering the bullets is attached, which can be thrown in or out of gear as may be desired, regulating the amplitude of the arc through which the breech is moved so as to spread the bullets over the required front. In its present state of efficiency the Gatling gun fires at the rate of 1,200 shots per minute, a speed of fire, by separate discharges, not as yet equaled by any other gun.

The Nordenfeldt, a contemporary of the Gatling, proved very efficient as a ship's gun. In it the barrels (usually 10) are placed horizontally side by side, and are immovable. Each barrel has its own firing mechanism, but all the locks, bolts, strikers, and spiral springs are contained in one box which is moved backward and forward by the operating lever. When the box is moved backward the cartridges fall out of the hopper on top and are deposited simultaneously in the grooves of the carrier. The forward motion of the box pushes them into the barrels, the cocking catches compress the spiral springs which are subsequently released by the lever in quick succession and produce a continuous fire. In this gun careful aiming from a moving platform is possible, so that at the right instant all the barrels may be fired at the object almost simultaneously, therefore its use-

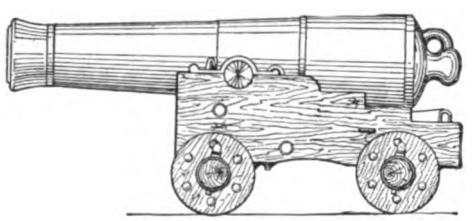
fulness as a naval weapon. Its speed of fire is about 600 shots per minute.

The Gardner Gun closely resembles the Nordenfeldt. It consists of two or more barrels fixed immovably side by side in the same horizontal plane. The loading, firing, and extracting mechanism is moved backward and forward by a crank turned by the hand. Shortly after the appearance of the Gatling in the United States the "mitrailleuse" was produced in Belgium, and subsequently adopted by France. It consisted of several barrels (usually 25 or 37) arranged around a central shaft and covered with a metal casing. The barrels were loaded through the breech by the use of a metal disk pierced by holes to correspond with the number of barrels, a cartridge being held in each hole or chamber. In firing, this disk was placed against the breech end of the barrels, then the box containing the strikers was placed against it and all of the cartridges discharged at once. It was used to some extent in the Franco-German war of 1870, but was never very successful, and has been completely superseded by the Gatling and other types. The speed of fire of the Belgian gun was about 440 shots per minute, but that of the French piece rarely exceeded 300. The Gatling, Nordenfeldt, and Gardner guns, as also the various forms of mitrailleuse, were generally made in rifle calibre (.45-inch), but Gatlings of .65-inch, and Nordenfeldts of 1-inch calibre, were constructed about the time the Hotchkiss one-pounders were produced, in response to the call of the English and the French authorities in 1887, for rapid-firing machine guns to be used against torpedo boats. The larger Gatlings and Nordenfeldts fire respectively about 200 and 100 shots per minute with sufficient velocity to penetrate the light iron plates generally used in the construction of torpedo boats. The five barrels of the Hotchkiss fire a total of 25 rounds per minute, but as its size has been increased up to the 6-pounders, which are capable of firing explosive shells or canister, its speed of fire has been relatively increased together with additional powers of penetration.

Semi-automatic Guns belonging to class 2 are represented by those of the Armstrong, Driggs, and Maxim-Nordenfeldt patterns, the last-named being the best known and the most effective. It has been adopted by the United States Navy to the exclusion of all other guns of the semi-automatic type, and is in fact the only gun of this character employed in the naval service of any country. Semi-automatic mechanisms are applied to guns too heavy to be operated by that of the ordinary machine gun. In them the recoil of the barrel is utilized as the actuating energy. The backward movement compresses the spring, which in turn pushes it forward again and forces the breech downward while the extractor throws out the empty cartridge case. In this position of the barrel the breech block is held open until a fresh cartridge is inserted which slides the extractors into the bore and allows the breech block to rise and close the breech, the gun being again ready to be fired. These mechanisms are most effectively used in guns of 2.24-inch and 3-inch calibre, giving them a speed of fire from 20 to 17 shots per minute, respectively.

Automatic Guns belonging to class 3 are the Hotchkiss, Colt, Yamanouchi (Japanese), and the Maxim. They are made in rifle calibres and are operated by the pressure of the powder gas upon a level or piston when the piece is discharged. The larger types are the Maxim-Nordenfeldt one-pounder, called "pom-pom" in the British-Boer war of 1899-1902; the Skoda automatic gun, and the Dawson-Silverman three-pounder. In these, excepting the last named, the recoil of the barrel or breech-block operates the mechanism. A description of the construction and operation of the Colt automatic gun will serve to give a general idea of those in which the pressure of the powder gas is used to actuate the mechanism. Near the muzzle the barrel is perforated radially by a small hole which is covered by a cylindrical lug attached to the front end of a vibrating lever pivoted on the gun. When the piece is discharged and the bullet passes the hole, the pressure of the powder gas in the barrel throws back the lug of the lever with enough force to reload and fire. The walls of the barrel are more than half of an inch in thickness, and it contains enough metal to prevent overheating without the use of a water jacket. The cartridges are attached to a bandolier or belt of woven cotton (250 to a belt), which is fed into the machine from a box at the side. The speed of fire is from 250 to 300 rounds per minute, so that when firing continuously a fresh belt of cartridges has to be placed in position every minute, but the consequent loss of time amounts to only a few seconds. For naval use those of .236- and .303-inch calibres, weighing about 42 pounds, are the most effective, generally being mounted on the ship's rail or on the rails of the fighting tops. A description of the Maxim .303-inch calibre automatic gun will be sufficient to explain the construction and operation of the type in which the recoil of the barrel is the actuating energy of the breech mechanism. It consists of a movable barrel and recoiling lock frame carrying a crank with a projecting arm and fusee to which a chain is attached. The fore end of a spiral spring is fixed to the non-recoiling breech casing, its rear end being connected with the recoiling crank and fusee. When the piece is fired the barrel and lock move backward together about an inch, then the barrel is pushed forward again by springs and separated from the lock, leaving a space between them. This space is filled first by the extracted cartridge case and then by a fresh cartridge which is forced into the barrel and fired by the subsequent forward motion of the lock, actuated by the stored-up energy of the fusee spring. It is provided with a water jacket and fires from 300 to 350 rounds per minute. In the field machine guns are used to deliver a destructive fire along a wide front, or a concentrated fire into massed troops. In the former case the traversing gear is employed, while in the latter the barrels are fired in a stationary position. The relative efficiency of the rifle calibres and the larger automatic guns may be more clearly understood by comparing a .303-inch gun, which fires about 350 bullets per minute and has a maximum range of 2,500 yards, with a 15-pounder, which fires six rounds of shrapnel shells per minute, and has a range of 6,000 yards. As each shrapnel shell contains 212 bullets the number of bullets delivered at the target amounts to 1,272 per minute. As naval

weapons, machine guns of small calibre are the most efficient. Mounted on light draft vessels they are very useful in close-range operations on rivers and on the waters of narrow harbors, while as boat guns they render efficient service to drive off the enemy preparatory to the landing of troops, or to cover their reembarkation. The efficiency of the larger calibres, however, is more questionable. The effect of the bursting of a one-pounder shell against the unarmored side of a cruiser, much less against the heavy armor of a battleship, is absolutely nothing; while against modern torpedo boats even the six-pounders are quite ineffective. Probably the best weapons for use against torpedo boats are rapid fire guns of about 3 to 4-inch calibre, throwing shrapnel shells, and capable of being carefully aimed. The impression that the projectiles discharged from a machine gun of any type can be directed like the jet from a hydraulic hose is absurd. The jump and jerk of recoil of the guns of even the smallest calibre is so powerful that good aim is out of the question at any range. On this account the larger machine



32-Pounder Carronade (1800).

guns are so constructed that they can fire single shots whenever desired—a capability which probably defines their most efficient use.

The organization of machine gun details and the method of their employment as attachments to regiments of cavalry and infantry, differ in the various countries. The lessons taught by their use in the Franco-German war, or in the operations of the British in their Egyptian and Indian campaigns, are quite inconsequential. The British-Boer war afforded an opportunity for the use of every form of modern machine guns, but under conditions unfavorable for a determination of their use in the future. That the noise of the "pom-poms" exerted a demoralizing effect greater than that of bursting shrapnel shells is undoubtedly a fact, and, although the "moral effect of gun-fire" is one of the important problems of military science, it is hardly worth more than an incidental mention in this connection. One fact, however, is clear, on account of their great mobility they will be advantageously employed in the future as auxiliaries to the regular field batteries, which they never can be expected to supersede.

The manufacture of ordnance requires the solution of a great many scientific and practical problems involving the adaptations of means to ends, and the exactitude of the adaptations increases with the increase in the size of the guns and their required greater efficiency.

So complex a subject is more conveniently treated by grouping the various operations into a number of general classes, as follows: Requirements for Efficiency; Principles of Design; Materials and Methods of Construction; Rifling; Systems of Loading; and Carriage and Mounts.

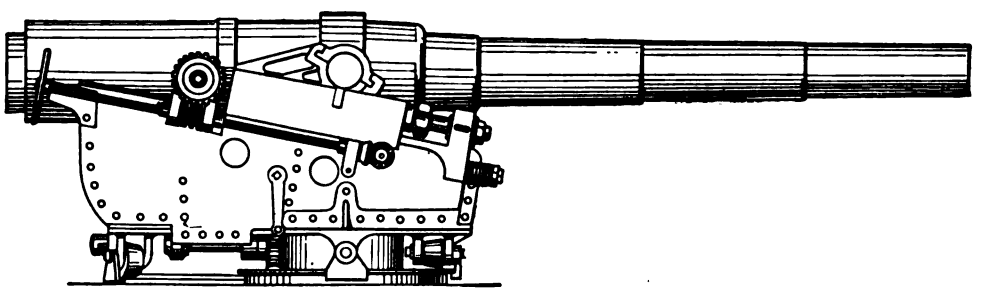
Requirements for Efficiency are, safety, accuracy of fire, destructive effect of projectile, and speed of fire. To these may be added that of mobility, especially applicable to field ordnance.

Principles of Design.—In designing a gun as an engineering structure, two distinct sets of conditions have to be considered—those regulating its proportions, influenced by the character of its intended use—and those pertaining to its mechanical construction, to withstand the strains it may be subjected to under the requirements for efficiency.

The three principal strains that a gun has to withstand are, (1) a circumferential tension caused by the outward pressure of the powder gas, acting radially with a tendency to enlarge the bore and split the gun open longitudinally; (2) a longitudinal strain having a tendency to stretch the gun or pull it apart in the direction of its length; and (3) a transverse strain caused by the weight of the parts of the gun overhanging beyond the point of support; all of which are brought into action the instant the gun is fired. The calibre of the gun having been determined, together with the conditions of loading—the weight of the projectile and the powder charge necessary to give it the required velocity; the pressure that will be exerted on the surface of the bore is determined by calculating its amount at a certain number of given points and a "pressure curve" plotted. Such a curve shows that the maximum pressure is exerted before the projectile has moved more than a few inches, and decreases rapidly as it approaches the muzzle. With the pressure as a known factor in the problem, the material having a tensile strength sufficient to sustain the forces that will be exerted is selected, and methods of construction determined, to dispose it economically and safely, consistent with the production of the desired ballistic results.

Materials and Methods of Construction.—In the development of ordnance increasing pressures compelled the employment of materials of greater and greater tensile strength and higher elastic limits. Wooden bars held together with iron hoops gave way to cast-iron, which in turn was superseded by bronze, brass, wrought-iron, and steel, until finally the pressures exceeded the inherent strengths of the materials and forced the adoption of methods of construction by which additional powers of resistance were derived from the *arrangement* of the material. In hollow cast-metal guns there is a limit beyond which increase in thickness does not give additional strength to resist bursting pressure. If the metal employed was incompressible, the resistance to the pressure by each concentric layer of the metal would be inversely proportional to the square of its distance from the axis of the bore. But as all metals possess not only the quality of compressibility, but that of extensibility as well, the interior layers are supported by those on the outside to a very great degree. Therefore the great object in construction is to so arrange the material that the exterior layers will take up as much as possible

of the pressure exerted upon the interior layers. Dahlgren first suggested the construction of guns in which the disposition of the materials was in accordance with the data obtained from the curve of pressures, while Rodman introduced the principle of initial tension. In the construction of modern built-up guns these principles are carried into effect as follows: An ingot of «low steel» is cast and allowed to cool slowly to avoid strains. It is then bored in a lathe, reheated, and forged on a mandrel. Consequent strains are removed by annealing, and the forged tube is turned and bored in a lathe to about the required size. After being oil-tempered, to give toughness, and re-annealed to remove strains induced by the tempering, it is re-bored in a lathe and smoothed by a reamer. In the meantime different parts of the outside of the tube are turned to sizes slightly exceeding the calculated shrinkages of the hoops intended to encircle them. This difference is about three ten-thousandths of the corresponding diameters, the shrinkages being so calculated that under no circumstances will any portion of the metal be strained beyond its elastic limit. Jackets and hoops are constructed in a similar manner and the various parts assembled into a complete gun. In the operation of assembling the tube is placed



6-inch Gun (1883).

in a vertical position in a pit; the hoop or jacket to be put on is subjected to a temperature of about 700° F., and its diameter expanded to a size about .06 inch greater than that of the part it is intended to surround. In this condition it is lowered over the tube until it rests upon the shoulder which fixes its position. It is then cooled. The water is first poured on and around it near the shoulder (to prevent the jacket drawing away from the shoulder when it cools), then progressively upward, over the entire hoop. The gun is then put on the lathe and its surface turned preparatory to the shrinking on of the next hoop, the operation being repeated until all the hoops are in place, including the trunnion hoop, onto which the trunnions are forged solid. The gun is then finish-bored to the required calibre, turned to the specified form and rifled.

Rifling.—When a spherical projectile is fired from a smooth-bore gun, the probability of its following the direction corresponding to the aim is very small. The tendency of such a projectile to follow the mean trajectory (path of flight) depends upon the amount of «windage» (the difference between the diameter of the bore and that of the projectile), and the exact sphericity of the projectile. Large windage is the principal cause of error, since it allows the projectile to rebound along the sides of the bore as it is driven forward, the direction of its departure from the muzzle being that of the last bound, instead of that of the axis of the bore; while the lack of exact sphericity in the shape of the projectile causes an unequal pressure of the air on the different parts of its surface, still farther deflecting it from the aimed direction. Accuracy of manufacture can reduce these errors, but cannot remove them entirely. Therefore by rifling the bore the projectile is caused to rotate around its own axis, which is coincident with that of the bore. Thus, the errors due to windage are completely eliminated and the effects of unequal air pressure are neutralized. Rifling is effected by furrowing the surface of the bore with a series of spiral grooves of uniform or increasing twist. The number of grooves and the amount of twist depends upon the calibre and length of the gun, the required muzzle velocity of the projectile, the length of the projectile, and the velocity of rotation necessary to keep it point-first while being driven through the air. The earlier muzzle-loading guns were rifled with grooves of a uniform twist, and the projectile was provided with ribs or studs which fitted into the grooves and caused it to rotate while being driven forward. As the size of the guns increased the greater strain of imparting rotation at starting tended to force out the studs and wear away the driving edges of the grooves. The casting-on of ribs was found to be impracticable on account of difficulties of manufacture, and all attempts to use expanding projectiles were unsuccessful. Therefore the system of increasing-twist, based upon the principle of the semi-cubical parabola, was devised and practically met all the requirements of the case. Studded projectiles were replaced by those with copper bands fitted around the base. These bands being slightly larger than the bore were forced into the rifling grooves and not only gave rotation to the projectile as it was driven toward the muzzle, but by cutting off all the windage acted as an effectual gas-check. The various systems of rifling, designated «single-groove,» «double-groove,» or «poly-groove,» according to the number of grooves employed, are here stated in the chronological order of their development and adoption, but the last-named is the one now used, exclusively.

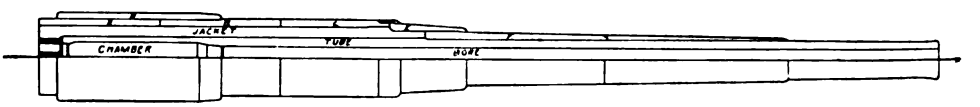
For example—the guns of the United States Navy are rifled under a poly-groove system in which the twist increases from 0 to 1 turn in 25 calibres. The grooves start parallel to the axis of the bore, but quickly incline to the form

of a parabolic spiral, the twist increasing to a point near the muzzle, from which point the curve is uniform. Upon discharge the strain of rotating is thrown forward toward the muzzle, the point of least pressure; the projectile enters the bore without a rending shock; it is rotated with increasing velocity as it moves forward, and leaves the muzzle, rotating at the rate of one revolution in a distance equal to 25 times its own diameter. In general the number of grooves is determined by multiplying the calibre, expressed in inches, by four. A 10-inch gun would have 40 grooves. In depth, they are about .05 inch, and several times as wide, being comparatively broad and shallow at the start, but gradually decrease in width toward the muzzle.

Systems of Loading.—Attempts to employ breech-loading systems may be traced farther back than even the earlier part of the 16th century, but until about 1880 they were attended by a comparative loss of safety and power in the larger guns. The theoretical superiority of the breech-loading system over that of muzzle-loading was unquestionable, but the conditions involved in closing the rear end of the bore (the seat of greatest pressure) temporarily, presented a problem very difficult of practical solution. As early as 1858 Armstrong introduced breech-loading guns into the English Navy, but, although his rifled breech-loaders, constructed in the early 70's, proved very powerful as compared to the old muzzle-loading smooth-bores, they also showed many serious defects of construction, and the English reverted to muzzle-loading. The experience of the other European powers was somewhat similar, but they continued experimenting on breech-loading lines, Krupp, in Germany, making especial advances. Since 1880, however, due to the great progress in mechanical construction, and in the production of suitable material, breech-loading systems have been universally applied to all classes of ordnance. The three principal and best-known types are those developed by Armstrong, in England; by Krupp, in Germany; and the Reffye system, the basic idea of which was originated by Chambers, in the United States in 1849, and subsequently developed by France about 1870.

In the Armstrong system a breech-block with a vent in it works vertically in a slot cut through the top of the breech into the tube of the gun, and is pressed firmly against the lip of the bore by a longitudinal breech-screw operated by a pair of powerful handles. The contact surfaces are of copper and they are renewed from time to time when worn out by the erosive effect of the escaping powder gas. It represented a great advance in gun construction, but was not a practical success. The inability to make the contact surfaces gas-tight, and the unwieldy weight of the sliding breech-block, even in guns of moderate size, constituted its chief faults. In the Krupp system, which is the most important of those employing a transversely sliding breech-block, a wedge of D section slides in a slot cut through both sides of the breech and across the bore. To load, the wedge is pulled out to the left, the charge is inserted through the rear of the breech, the wedge is pushed back into position and pressed hard against the end of the bore by a screw with powerful handles. For a gas check the "Broadwell ring" is used. This device is a ring of L section which fits into a recess formed by enlarging the rear end of the bore. The pressure of the gas expands the ring, one flange of which is pressed against the walls of the powder-chamber and the other against the face of the wedge, thus completely sealing the joint and effectually cutting off the escape of gas to the rear.

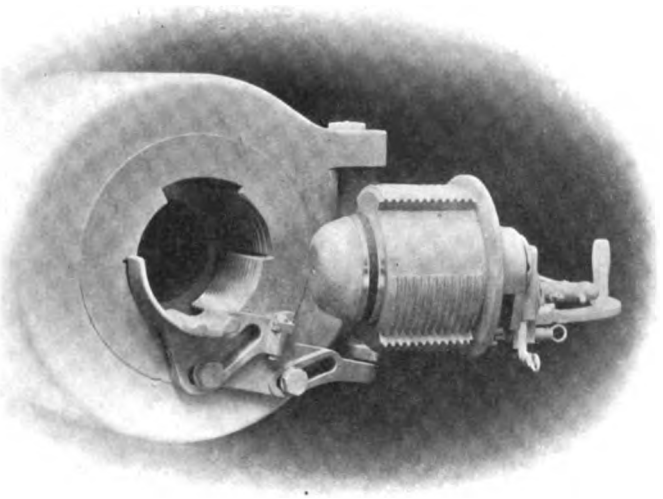
In the French system, better known as the "interrupted or slotted screw system," the breech is closed by a longitudinal screw-plug working from the rear and swung on a vertical hinge permitting it to be revolved horizontally to the side when it is withdrawn. The screw on the plug and the engaging screw on the breech are each divided circumferentially into six sectors, in three of which the screw threads are cut away, leaving the sectors alternately threaded and plain. To close the breech, the screw-plug is revolved around the vertical axis of the hinge to a position opposite the hole in the breech; the threaded sectors of the plug are made to coincide with the plain ones of the engaging screw in the breech and the plug pushed straight in, its threaded sectors being made to engage with those in the breech by one sixth of a turn of the translating crank. This system employs the De Bange gas-check, consisting of a plastic pad of asbestos flour and suet, held in a ring-shaped canvas bag between two flat metallic rings. The stem of a mushroom-shaped spindle or obturator passes through the holes in the pad and rings to the rear end of the screw-plug. Through the axis of this stem the vent is driven. When the breech is closed, the mushroom head enters the tube and the pad and rings are held in position against the face of the screw-plug. Upon discharge the spindle is forced back by the pressure of the gas, while the pad, squeezed and forced out radially, presses itself and the outer lips of the metallic rings tightly against the surface of the bore, thus preventing the escape of gas to the rear. This device, although very effectual, had a tendency to stick or jam in the bore. This is obviated by the use of split rings which constitutes one of the most important improvements of the modified form of this system, exclusively used by the United States.



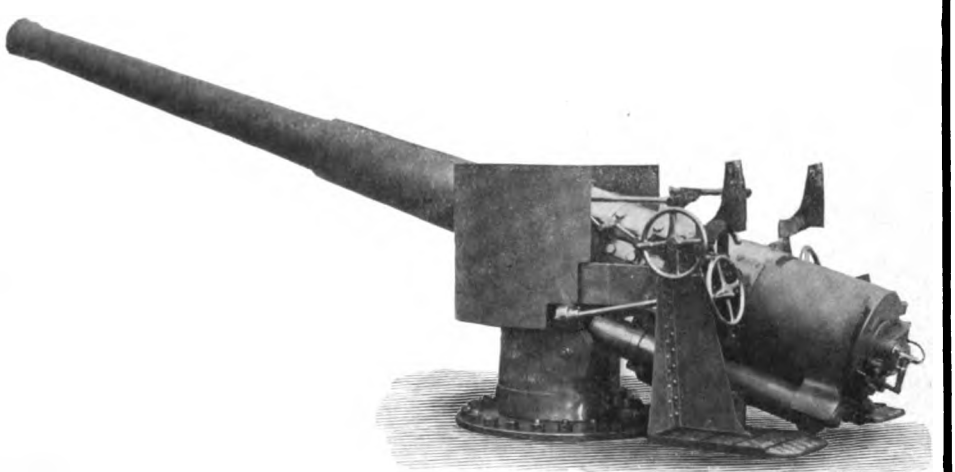
Section of Built-up Gun.

Gun Carriages and Mounts.— Gun carriages are divided into two general classes — stationary and mobile. Their mode of action is signified by the designations, barbette, casemate or turret, motor carriage, and disappearing carriage; to any or all of which the additional qualifications — recoil or non-recoil — may be applied.

Stationary carriages are used with sea-coast



Breech Mechanism for 6 in. R. F. Gun.



Six inch R. F. Gun, with Cradle Mounting.

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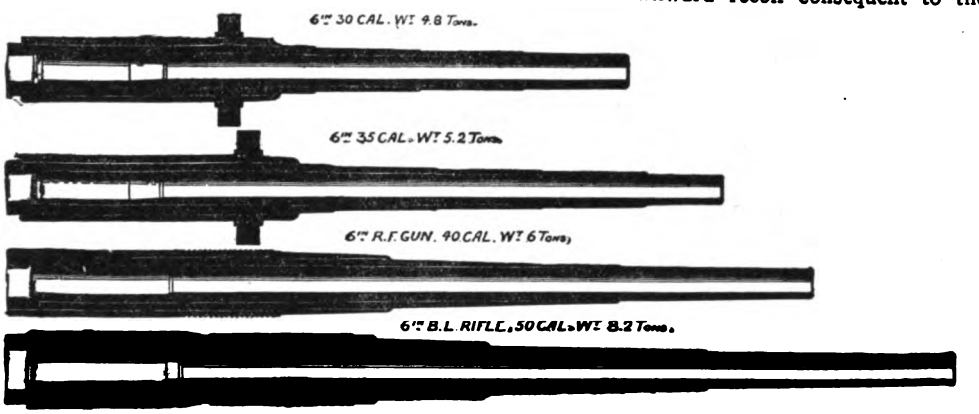
ordnance. The modern type consists of a cast-iron base ring solidly imbedded in concrete, upon which is mounted a circular racer or turn-table, carrying the chassis. A top carriage of some form, on which the gun is directly mounted, moves back and forth upon the chassis, its motion in recoil being controlled by a hydraulic brake. This brake consists of a cylinder with a piston working in oil, the former attached to the top carriage and the latter fastened to the chassis. When the gun is fired and the recoil of the top carriage moves the cylinder backward, the oil passes from one part of the cylinder to the other through holes in the piston head. The size of these holes is regulated by taper-rods, rotating-disks, or throttling-bars, so that the varying pressure of the recoil is transformed into a constant pressure in the brake. The gun is returned to firing position by the power of springs, compressed air, or by gravity. Elevations for range are obtained by revolving the gun around the axis of the trunnions (at or near the centre of gravity of the piece) by a screw or a rack and pinion device at the breech, while traversing is accomplished by rotating the turn-table.



Carriages for Disappearing Guns are best represented by the "Crozier-Buffington," used in the United States, and the "Elswick," used in England. In the former, the trunnions rest in the upper ends of a pair of lever arms, to the lower ends of which a counterweight is attached. The axle connecting the centres of the lever arms rests upon a top carriage, the motion of which is controlled by a hydraulic brake. In firing position, the lever arms are almost vertical, the top carriage and brake cylinder well forward, the gun lifted up and its muzzle thrust over the parapet. The breech of the gun is held at the proper height by a frame, the sides of which are pivoted at the top to the breech, and at the bottom to a movable slide which is raised or lowered for changes of elevation by an adjusting rod. When the gun is fired, the force of the recoil moves the top carriage to the rear, causing the lever arms to rotate backward and assume a horizontal position. By these motions, the gun is first moved to the rear almost horizontally until its muzzle is clear of the parapet, then sharply downward into the position for loading, and held in that position by pawls which catch on the counter weight cross-head. Return to firing position is accomplished by the action of a lever which drops the counter weight by releasing the pawls. Thus, all the loading, elevating, and traversing operations are performed while entirely protected from the enemy's fire, under directions received from a distance by telephone, or from the man on the sighting platform, who is the only one of the gun crew exposed to fire. The basic principle of this carriage was suggested by Gen. Buffington, Chief of Ordnance, U. S. Army, in 1872, but the credit of its development to the present state of efficiency belongs to one of his successors, Gen. William Crozier.

In the Elswick carriage, the lower ends of the lever arms are held by fixed pivots, and their rotation is controlled from their centres by a rod to the end of which the piston of a hydro-pneumatic cylinder is attached. The force of recoil is thus resolved into the energy of compressed air, which returns the piece to firing position.

Mortar Carriages originally consisted of simple iron boxes provided with trunnion beds, but now they are composed of a turn-table and chassis, the mortar being mounted on the end of a lever pivoted at its lower end to the turn-table. A hydraulic buffer placed under the lever receives the downward recoil consequent to the high elevation at which the piece is fired, while an arrangement of spring columns returns it to the firing position. Mortar carriages for field or siege purposes are generally of the stationary type, transported from place to place in wagons.

Mobile Gun Carriages are of two types — those used for field, and those used for siege purposes. They are similar in principle but differ in size and detail. Both types have two wheels with an axle-tree, in front, and a trail to give a third point of support on the ground, behind. Up to 1860, they were all made of wood, with iron axle-trees and metal bracings. The trunnion beds were formed in the front ends of the flasks (sides) of the trail, and the recoil of the gun was checked by the resistance of the ground and by a friction brake as the carriage moved backward. Wood, however, was gradually superseded by iron, and since 1880, all gun carriages have been made altogether of iron or steel. To increase rapidity of fire, and to enable the carriages to bear guns of greater power without too much recoil, brakes have been devised which are set by the recoil, and released by the forward movement of the gun. In the Ehrhardt carriage, adopted by England, the gun is carried on a slide attached to a hydraulic brake, or to a

cylinder surrounded by a helical spring, which allows it to recoil about 45 inches and then returns it to the firing position, quickly and without shock. The carriage is unmoved by the discharge, its backward movement being checked by a spade with a sure hold in the ground, and it is so stable, that the operators are able to sit on the trail and perform the various duties of sighting, etc., while the piece is being fired. Similar forms of carriages are manufactured by the Bethlehem Steel Company, the Vickers-Maxim Company, and several others, all of which are of a very efficient character. In the carriages adopted by the United States, the best points of the Ehrhardt are combined with improvements suggested by Captain Wheeler, of the Ordnance Department. In it the gun recoils through a bronze cradle to a distance of 46 inches. Two cylinders containing oil check the backward movement, while helical springs return the piece to firing position.

Siege Gun Carriages for field use are generally attached to platforms which help to control the recoil. In the stationary form they are much heavier than the field carriages, and are built high enough to allow the gun to be fired over a six-foot parapet. The greater weight (about 6,000 lbs., as against the limit of 4,000 lbs., prescribed for the field carriage), is required by the greater energy of the recoil.

Gun Mounts, including those used for all forms of rapid fire guns as well as those employed with the larger types of ordnance, will be found described under the title NAVAL GUNS.

Large Guns.— A fair consideration of the subject of ordnance would hardly be complete without a brief mention of the maximum size and power of the guns constructed from time to time, since the introduction of gunpowder cannon up to the present date, or a reference to some constructions embodying certain novel features which at one time promised types of ordnance of great destructive power. The largest gun constructed in the 15th century appears to be the "Mahomet II.," by the Turks. It required 200 men and 30 pairs of oxen to move it, and threw a projectile weighing 600 pounds. Larger pieces, capable of throwing projectiles weighing over 1,000 pounds, are still in existence in the batteries along the shores of the Dardanelles, but the time of their manufacture is somewhat uncertain. The largest gun made in the 17th century, was the cast-iron gun named the "Malick é Meidan" (Lord of the Plain). It was constructed at Bejapoor, India, by Arunzebe, or by the Mahrattas. It was 14 feet in length, 28 inches bore, and fired a projectile weighing 1,600 pounds. In 1880, the English made guns weighing from 100 to 110 tons, of about 18 inches bore, which fired a projectile weighing 2,000 pounds, with a velocity of 1,640 feet per second. About the same time, the United States produced a gun weighing 127 tons, of 16 inches bore, which fired a projectile weighing 2,400 pounds, with a velocity of 2,300 feet per second. It was the most powerful gun ever built, and will probably be the last of the great guns, as the opinion of the present time, molded by the experience of the late wars, is adverse to the construction of guns above the 12-inch calibre, and even this limit will probably be reduced by the experience of the future.

As a matter of fact, the most effective "all round" gun at the present time, appears to be the 8-inch breech-loading rifle, firing a projectile weighing 250 pounds, with a velocity of 2,334 feet per second, and capable of discharging six aimed shots per minute. Of guns embodying novel features, that invented by Capt. Zalinski, of the United States Army, appears to be the pioneer of large pneumatic ordnance. In the larger form, it consisted of a smooth-bore tube about 50 feet long, and of 15 inches calibre. By the propelling agency of compressed air, used in the gun at a pressure of 1,000 pounds to the square inch, it was capable of throwing a projectile containing 100 pounds of high explosives, such as dynamite or nitro-glycerine, to a distance of about 5,000 yards. It was designed for coast-defense purposes, but has also been used at sea. The U. S. cruiser Vesuvius, equipped with three tubes, was employed at Santiago during the Spanish-American war, but did not attain the success anticipated. The Sims-Dudley, another form of pneumatic gun also used about that time, appears to have been a little more successful. It throws a much smaller projectile, containing about four pounds of high explosives, by air compressed by explosions of gunpowder in an auxiliary barrel located under the main tube. The Gathmann gun, another type of ordnance designed to throw projectiles containing large quantities of high explosives, appears as yet to be in the experimental stage of construction, while as a matter of fact, the development of pneumatic guns in general, up to the point of a permanent place in armaments, is extremely problematical.

Bibliography.— For more specific information on ordnance matters, the following named publications are recommended: 'Journal of the United States Artillery' (Fortress Monroe, Va.); Holley, 'Ordnance and Armor'; Ingersoll, 'Text-book of Ordnance and Gunnery'; Annual Reports of the Chief of Ordnance (U. S. Army and Navy); Bruff, 'Ordnance and Gunnery'; Greener, 'Modern Breech-loaders and Choke-bore Guns'; Text-books on ordnance, ammunition, and gun carriages, published by the English War Office; 'Revue d'Artillerie' (Paris, monthly); 'Mittheilungen über Gegenstände des Artillerie und Genie-Wesens' (Vienna, monthly); 'Revue de l'Armée belge' (Brussels, monthly).

W. MOREY, JR.,
Consulting Civil Engineer.

Ord'nance, Department of, in the United States War Department. See ARMY OF THE UNITED STATES.

Ordovician, ôr-dō-vish'ĭ-an, in geology, a term introduced in 1879 by Lapworth for what Murchison had called the Lower Silurian as early as 1835; the term Silurian being used thereafter for the most part only of the Upper Silurian in Murchison's nomenclature. Hence the Ordovician System may be defined as the rocks of the era after the Cambrian and before the Silurian, the latter term being used in the sense explained above. The name Ordovician is derived from a Welsh tribe. The system in America subdivides into the Trenton and Canadian periods; the former contains the Hudson, Utica and Trenton epochs, with the last of which the great Cincinnati anticline is to be connected; and the Canadian Period being represented by the Chazy limestones and the Calciferous epoch (or Beekmantown sub-group). In Great Britain the Ordovician includes the

following epochs: Arenig; Llandeilo flags; Bala, or Caradoc Sandstone; and Lower Llandovery. Shaly and sandy strata occur in the upper and lower parts of the Ordovician, and occasionally, as in the central part of North America, the same extremes are calcareous; but these are slight exceptions to the rule, which is that the system is predominantly limestone. For the distribution of the Ordovician rocks see the articles CANADIAN SERIES; CHAZY STAGE; CINCINNATI ANTICLINE; TRENTON STAGE; UTICA STAGE; etc.

Ord'way, John Morse, American educator and chemist: b. Amesbury, Mass., 23 April 1823. He was graduated from Dartmouth College in 1844 and engaged in chemical work. In 1847 he was superintendent of the Roxbury Color and Chemical Company's works at Roxbury, and in 1850 accepted a professorship in Grand River College, Trenton, Mo. After 1854 he re-engaged in chemical work; in 1869 was appointed professor of industrial chemistry and metallurgy at the Massachusetts Institute of Technology, and since 1884 has held a professorship at Tulane University and its branch for women, Newcomb College, New Orleans, La.

Ore. An ore may be defined as any mineral or aggregation of minerals from which a metal or metals can be extracted at a profit. This definition is not exact, but is one often used by geologists and mining engineers. Since the prospect of profitable extraction is involved it follows that a mineral containing a certain per cent of a metal may be considered an ore in one region and not an ore in another. Thus pyrotite containing two per cent copper would be called copper ore if situated where it could be worked to advantage, and would not be called a copper ore if situated, say, in Tibet. Again certain minerals formerly not considered as ores are not now, and other minerals not ores now will be considered such in the future. Bauxite is an ore of aluminum, but aluminum was not known a century ago. Similarly clay will be an ore of aluminum with the progress of metallurgy. Ores containing a relatively small proportion of the metal sought are termed lean or low grade, those containing a high per cent rich or high grade; the relative percentages depend on the value of the metal. Ore containing one per cent of gold would be extremely rich. In the Lake Superior country iron ores containing less than 50 per cent iron are low grade. Metals may be disseminated through a rock in the native state or as chemical compounds of sulphur, oxygen, carbonic acid, etc. Gold and silver, the noble metals, occur native as does copper. An ore carrying native gold is called free-milling. In general it may be said that nine tenths of the commercially important ores are sulphides, oxides, hydroxides, carbonates and native metals. For information on methods of extracting metals from their ores see METALLURGY, also COPPER; GOLD; IRON, etc. For a discussion of methods of occurrence of ores see below under ORE DEPOSITS.

SAMUEL SANFORD,
(Engineering and Mining Journal.)

Ore Deposits. It is impossible to draw a fixed boundary between those occurrences of metalliferous minerals that are to be regarded as ore deposits and those that are not. Generally speaking an ore deposit is any occurrence of metalliferous minerals, large enough and rich enough to be worked at a profit. It thus appears that a body of mineral might be properly regarded as an ore deposit under some conditions and not under others. Magnetite which in places is an important ore of iron is often found scattered through granite, yet no one would regard a granite ledge as an iron ore deposit. The exact point at which rocks containing iron oxides become iron ore bodies is determined by the factor of cost of extraction. A ledge containing a small percentage of iron favorably situated might be profitably worked, if situated in some remote locality it could not.

Two views of the origin of metalliferous deposits are held. Accepting the nebular hypothesis of the origin of the solar system, we may believe that (1) when the earth cooled so far that water could rest on its surface, this hot primeval ocean held in solution or suspension all the metals. These were subsequently deposited as various minerals in the sedimentary rocks, and in the ages since these rocks have been partly or completely fused, and worked over many times, so that in brief, all deposits of ore near enough to the earth's surface to be reached by man, contain metallic atoms that were once in solution in the ocean. Or we may believe (2) that as the earth cooled from a vapor to a semi-gaseous solid and finally to its present state, the atoms of the heavier metals, or those of least chemical activity, were the first to collect, to form the nucleus of the earth, and hence that the metalliferous deposits worked to-day and the metals in suspension in the ocean were derived originally from molten rocks or rock magmas that came from the unknown depths of the earth. A strong reason for this belief is that the specific gravity of the earth as a whole is considerably greater than what is indicated by the average rocks which compose its crust. The results of recent investigations of rare metals of high specific gravity point in the same direction. Metals once thinly disseminated through a rock may become concentrated into deposits we call ore bodies in a great variety of ways. In a molten magma slowly cooling at great depths as the minerals crystallize out they may collect in aggregates, either from unequal cooling of the magma or from what we may call mineral attraction. It is fairly certain that bodies of chrome iron ore, of nickel-copper sulphides, of magnetite and possibly platinum have formed by cooling from fusion. Again supposing the minerals distributed thinly through a cooled magma — an igneous rock — they may be concentrated into workable ore bodies, (1) by the decay of the rock when, after overlying strata have been uplifted and eroded, its constituent minerals are broken up and removed by air and water and only the more resistent are left. Thus are formed the so-called *placer* deposits, whence has come much of the world's supply of gold, also the principal tin deposits. The minerals removed in suspension or solution in surface water and the contained metals may be precipitated chemically, or by some form of organic life. Thus have beds containing various iron compounds been formed, the bog iron ores, and those silicates which after a long history of pressure, heat, and partial solution are now represented by the Lake Superior iron ore deposits. Again the still-buried igneous rock

at its contact with other rocks may cause all manner of chemical reactions. In regions where the earth's crust is deeply disturbed and the rocks bent, twisted and fractured by mountain building forces, there also may igneous rocks well up from regions of partial or complete fusion, and through the rock fractures hot waters or vapors charged with metals can penetrate. By far the greater number of mineral deposits have probably been formed by the reaction between such heated waters and the adjacent rocks.

Classification.— Many attempts at classifying ore deposits were based on form and mode of occurrence. Lately geologists have realized that the form of a deposit was from a scientific standpoint less important than its origin. Schemes of classification have been devised which take into consideration both form and mode of origin, but the latest classifications are based wholly on origin. The following scheme is that proposed for metallic ore deposits by C. R. Van Hise.

1. Sedimentary
   (*a*) Chemical precipitates
   (*b*) Mechanical concentrates { (1) Residual deposits; (2) Stream deposits; (3) Beach deposits }
2. Igneous
   (*a*) Magmatic secretions
3. Metamorphic
   (*a*) Deposited from gaseous solution
   (*b*) Deposited from aqueous solution { (1) Ascending waters; (2) Descending waters; (3) Ascending and descending waters }

See GEOLOGY.

SAMUEL SANFORD,
'Engineering and Mining Journal.'

O'reads, in Greek mythology, a name given to various nymphs of the mountains.

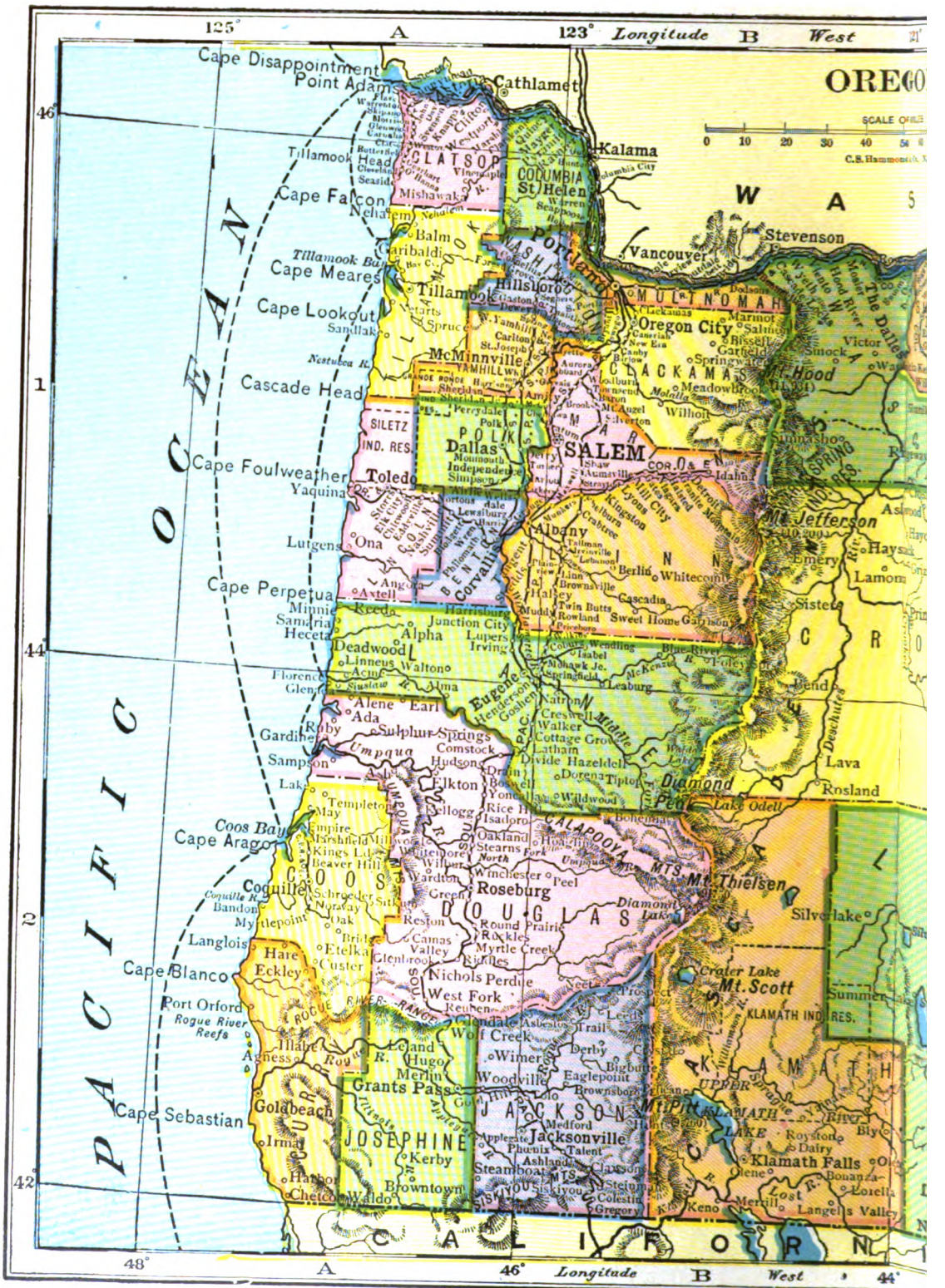
Örebro, ĕ'rĕ-broo, Sweden, (1) a town, capital of the län of same name, on the Svart-Elf, near the western extremity of the Hjelmar Lake, 101 miles west of Stockholm. Its buildings are almost entirely modern, being built after a great fire of 1854. One of these is a handsome Gothic town-hall. The only ancient buildings are the castle, on an island in the river, now used for public offices; and the church, which contains some interesting monuments. The manufactures comprise machinery, chemicals, matches, etc., and there is a good trade. Örebro was the first Swedish town in which the Reformation was formally established (1529). Pop. (1900) 22,013. (2) The län consists generally of undulating plains, watered by numerous streams, and containing many lakes. The only hilly district is in the north, where there are several forests, and valuable iron and other mines. The pastures rear fine cattle. The only exports of consequence are iron and timber, transmitted to Stockholm or Gottenburg. Pop. (1900) 194,924.

Oregon, one of the United States, on the Pacific coast, bounded north by the Columbia River, which separates it for the most part from the State of Washington; east by the State of Idaho; south by Nevada and California; and west by the North Pacific Ocean. The State lies between lat. 42° and 46° 18′ N., and between lon. 116° 33′ and 124° 25′ W. Its extreme length from east to west is 395 miles, and from north to south 278 miles. Its area is 94,560 square miles or 60,518,400 acres of land surface, and 1,470 square miles of water surface. It ranks seventh in size among the States, and was admitted to the Union 14 Feb. 1859. There are 32 counties in the State. The population in 1900 was 413,566. The capital is Salem.

Topography.— Primarily Oregon is a mountainous State, three great ranges dividing it from north to south; the Coast Range from 10 to 30 miles from the ocean; the Cascade Mountains, from 110 to 150 miles inland; and the Blue Mountains in the eastern part. The Coast Range has an extreme altitude of 4,000 feet, and is covered with dense forests. The Cascade Mountains, a continuation of the Sierra Nevadas, have an extreme height of 7,000 feet, with several peaks rising 2,000 to 5,000 feet higher. Mount Hood reaches an altitude of 11,500 feet, McLoughlin, 11,000 feet; and Jefferson, 10,500 feet. The Cascades are heavily timbered to the snow line. Four transverse ranges connect the Coast Range with the Cascades: the Callapooia, Umpqua, Rogue River and Siskiyou Mountains. The Willamette River Valley, lying between the Coast Range and Cascade Mountains, and the Columbia River and California spur, is 150 miles long, from 30 to 70 miles wide, and is extremely fertile. Eastern Oregon, embracing two thirds of the State, is a high table-land, with little rain fall, and sparsely populated. There are fertile valleys along the rivers and lakes in the southern portion, and in the Blue Mountains. The coast-line, which has an extent of 300 miles, is generally rugged and precipitous. There are, however, several small bays or harbors, such as Tillamook, Winchester, and Coos, all of which are land-locked, with narrow entrances. Toward the south the coast runs to an angle ending in Cape Blanco.

Geology.— The State has a varied geological structure. The Coast Range and Blue Mountains are of Eozoic formation; the Cascade ranges and the eastern part of the State, of volcanic, with its ridges and hills of obsidian; and the Pacific Coast. Willamette Valley, and part of the Umpqua Valley are of Tertiary formation. The Cretaceous fossil deposits are found in the upper valleys of Des Chutes, Crooked and John Day rivers, and the Grande Ronde Valley. The Glacial, Champlain, and Terrace periods are well represented. The metalliferous fields which have made California so famous are traced into Oregon. Gold is found in various places and successfully worked. Silver, copper, iron, nickel, cinnabar, and coal are also worked. There is a general lava and volcanic formation in the mountains of the State. In the cañon of the Snake River the rocks are ancient metamorphic granites, gneisses and mica-slate. In the southwest there is a belt of slate and serpentine. Generally throughout the State the soil is of volcanic origin, with alluvial deposits in the valleys, and is extremely fertile. In the central and southeastern portions of the State, the rainfall is very light, and the farming depends largely upon irrigation.

Rivers and Lakes.— The largest river is the Columbia, which forms three parts of the northern boundary of the State, and flows nearly due west for over 300 miles, and is navigable to its mouth in the Pacific. Its great tributary, the Snake River, flowing north, and serving as a boundary of a great portion of the State east-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Cape Disappointment
Point Adams
Cape Falcon
Tillamook Head
Cape Meares
Cape Lookout
Cape Foulweather
Cape Perpetua
Coos Bay
Cape Arago
Cape Blanco
Port Orford
Rogue River Reefs
Cape Sebastian
Cathlamet
Kalama
Stevenson
Vancouver
Portland
Hillsboro
Tillamook
Oregon City
McMinnville
Dallas
SALEM
Toledo
Albany
Corvallis
Eugene
Roseburg
Coquille
Bandon
Myrtle Point
Gold Beach
Grants Pass
Jacksonville
Medford
Ashland
Klamath Falls
Crater Lake
Mt. Scott
Mt. Thielsen
Diamond Peak
Mt. Hood
Mt. Jefferson
Lava
Bend
Sisters
Silver Lake
Summer Lake
Lake Odell
Rosland
Keno
Merrill
Malin
Tulelake
Yreka
Weed
Mt. Shasta
CALIFORNIA
WASHINGTON
COLUMBIA
CLATSOP
TILLAMOOK
CLACKAMAS
MULTNOMAH
MARION
POLK
LINCOLN
BENTON
LANE
DOUGLAS
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CURRY
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JACKSON
KLAMATH
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WARM SPRINGS IND. RES.
Nestucca R.
Tillamook Bay
Yaquina
Lutgens
Ona
Siuslaw R.
Umpqua R.
Coquille R.
Rogue River
Illinois R.
Applegate
Siskiyou
Klamath R.
Williamson R.
Sprague R.
Deschutes R.
Columbia R.
Hood River
The Dalles
Lost R.
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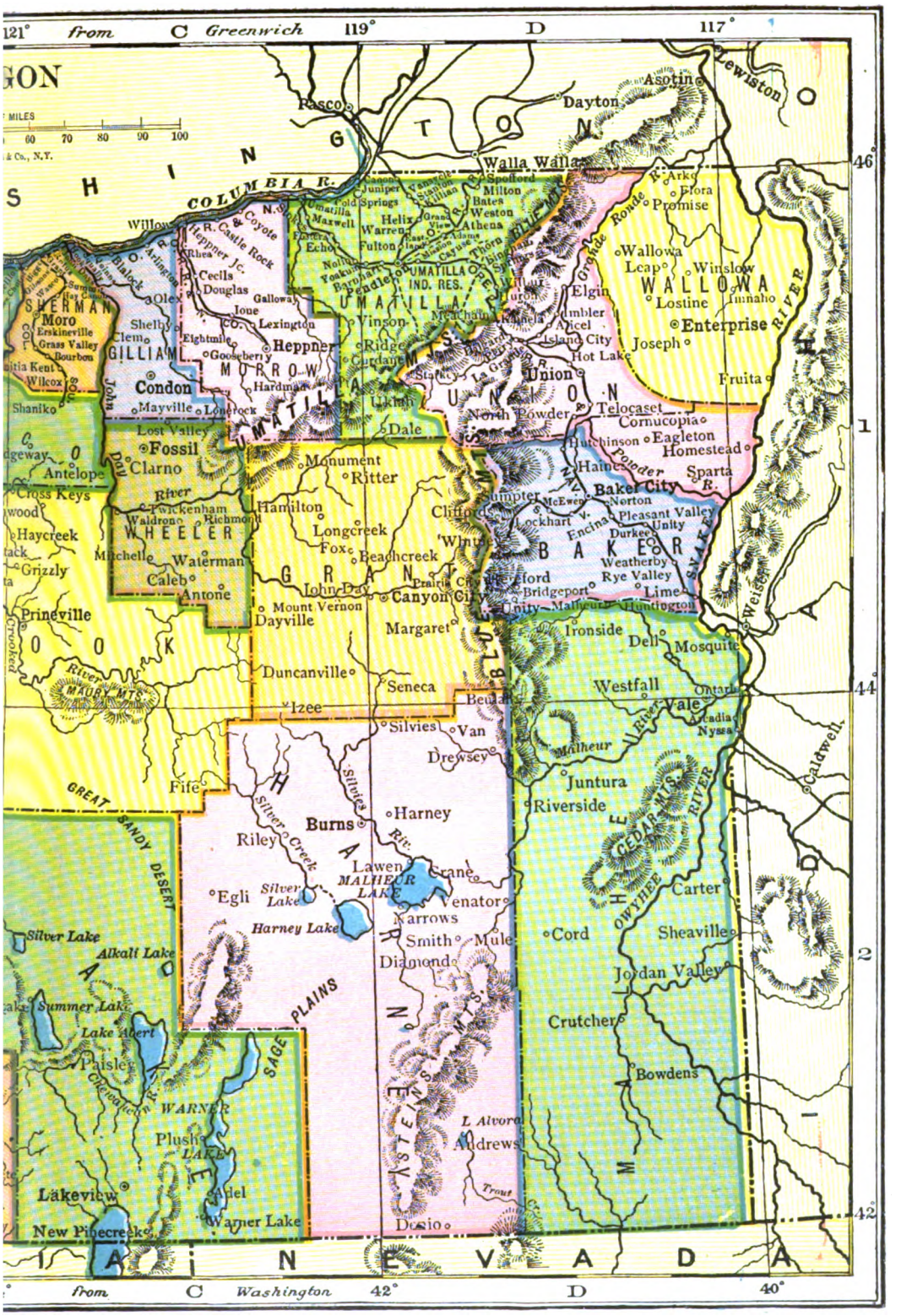
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Hot Lake
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ward, and its affluents, the Umatilla, John Day, and Des Chutes rivers, on the east side of the Cascade Range, and the Willamette on the west side, all flowing into the Columbia. The Columbia has a drainage area of 245,000 square miles. The head of navigation for sea-going ships is at Portland, about 100 miles inland. From here to the Cascades navigation is open excepting for a short time in the winter when the river is frozen over. Above The Dalles the Columbia is navigable for 190 miles and the Snake River for 180 miles. The Columbia is noted for its beautiful scenery and the great number of salmon taken from its waters. Other well known rivers in the State are the Rogue, Coquille, Umpqua, Siuslaw, Alsea, Yaquina, Nestuca, Nehalem, Lewis and Clarke, Clatskania, Youngs, Sandy, Hood, Owybee, Malheur, Burnt, Powder, and Grande Ronde. The principal lakes are, Klamath, Goose, Warner, Salt, Christmas, Albert, Summer, Silver, Henry and Malheur. Crater Lake in the Cascades, 8,000 feet above sea-level, is the crater of an extinct volcano, 10 miles in circumference, and surrounded by bluffs 2,000 feet high. It is the deepest body of fresh water in America. Goose Lake lies partly in California.

Climate.— A warm oceanic current from Japan flowing southward along the Pacific coast gives western Oregon a very mild winter climate. In the summer the northwest winds are cool. On the coast the mean temperature for January is 42.2°, and for July 62.3°, while great extremes are rare. In the eastern part of the State the mean temperature is 29.6° for January and 66.9° for July. In winter the extremes fall below zero, and sometimes nearly 30° below. In the west the rainfall averages 89.6 inches, in the Willamette Valley, 50.8 inches, in the east, 12.7 inches, and in the south-central portion only 6.5 inches. The wet season is from October to March. Thunderstorms are rare.

Zoology.— Since Oregon has been populated and developed the grizzly bear, black bear, cinnamon bear, gray wolf, coyote, panther, catamount, wildcat, polecat, deer, antelope, elk, and mountain sheep, all formerly very numerous, have retreated to the mountains or gradually disappeared. There are still to be found in more or less abundance such animals as silver foxes, martens, rabbits, squirrels, raccoons, porcupines, beaver, ottor, muskrats and seals, while in the lakes and rivers are salmon, herring, trout, halibut, smelt and other fish. There are also oysters, shrimps, crabs and clams. The birds include the eagle, hawk, pelican, cormorant, gull, crane, albatross, vulture, buzzard, raven, crow, jay, robin, swallow, sparrow, rice-bird, hummingbird, swan, goose, duck and pigeon. Reptiles and insects of the more common varieties are numerous.

Minerals.—Oregon abounds in mineral wealth, but gold is the only product extensively mined. It is found mostly in the northeast, in the Blue Mountain region. Silver, lignite, coal, zinc, cinnabar, mercury, platinum, iridium, lead, antimony, iron, copper, magnetite and nickel are also found here. In 1900 the principal mineral productions included gold, 81,980 fine ounces, valued at $1,694,700; silver, 115,400 fine ounces, valued at $71,548; and coal, 58,864 short tons, valued at $220,001. The building stones were granite, valued at $5,313; sandstone, $5,450; and limestone, $10,900. The production of mineral waters was 49,300 gallons, valued at $11,960, and the clay products had a value of $327,374.

Fisheries.— The canning of fish ranks second among the industries of the State, with products valued at $1,788,809 in 1900, as compared with $1,643,324 in 1890. This industry, which is almost entirely the canning of salmon caught in waters of the Columbia River and its tributaries, has its centre in the city of Astoria, and is carried on almost exclusively by the Chinese. The industry dates back to 1866, and reached its maximum production in 1883. It is carried on also on the north side of the Columbia River, in the State of Washington, the value of the product of this latter State in 1890 being nearly a third of that of Oregon. The Columbia River has long been famous for its salmon, the product for the year 1895 "exceeding in value that of any other river in the United States or the world." The exhaustion of these fisheries has been averted by more rigid laws against improvident fishing, and by the artificial propagation of fish. The value of the fish taken in Oregon in 1900 amounted to over $2,000,000, and 8,000 persons were employed in the industry. Since 1898 several refrigerating and freezing plants have been erected, and these, together with the use of refrigerator cars, have made possible the shipment of hundreds of tons of fresh fish annually from Portland to the east and to European cities — a fact which has tended to check the increase in the canned product during recent years.

Timber and Forest Products.—The mountains and highlands are heavily covered with evergreens, yellow, sugar, and scrub pine, yellow and white fir, red and white cedar, several varieties of spruce, yew, juniper, tamarack, maple, alder, ash and oak. In the eastern part there are dwarf pine and juniper. In the valleys are cottonwood, willow, birch, aspen, poplar, dogwood and wild cherry. The Oregon myrtle is a common tree. Out of a total area of 96,030 square miles, 28,843 square miles, or about 30 per cent, are covered with timber of merchantable size and quality; 40,228 square miles, or 43 per cent, are wooded. The crest of the Cascade Range is a natural dividing line between two very different portions of Oregon. West of this the rainfall is heavy, and consequently the forests are, as a whole, dense and in parts extremely luxuriant. East of that boundary the rainfall is light, and the forests are comparatively scanty and open, and the stand of timber is small. The total area of that part of the State west of the crest of the range, is 28,877 square miles, of which 15,089 square miles, or 52 per cent, are occupied by merchantable timber, and 24 per cent is open country. In contrast to this, the eastern part of the State comprises 65,683 square miles, of which 13,754 square miles, or only 21 per cent, are timbered, and 68 per cent is open country. The most startling feature shown by the land classification of this State is the extent of the burned areas, especially in the coast ranges and in the northern half of the Cascades. These burned areas comprise altogether not less than 7 per cent of the area of the State. Out of a total area, at one time timbered, not less than 18 per cent has been destroyed by fire. The present stand of timber in the western portion of the State being approximately 154,713 million feet, and the burned area being about one third of the

timbered area, the destruction of timber by fire in this part of the State has been approximately 51,000,000,000 feet. Similarly, it appears that in the eastern part of the State the destruction amounts to about 3,000,000,000 feet, a total of 54,000,000,000 feet in the State. Thus, at $1 per 1,000 feet, the average stumpage price, gives a total loss by fire of $54,000,000. Much of this burned country is rapidly reforesting, and in 1904 was covered with a dense stand of young trees. The earliest burns in the State of which we have record occurred in 1843. From that time down to 1903, fires of greater or less magnitude have occurred yearly, mainly in the late summer and early fall, when everything is driest. The total stand of timber in the State is estimated at 213,398,000,000 feet. West of the crest of the Cascades, the total stand of timber is estimated at 171,780,000,000 feet. The total stand of timber upon the area east of the Cascades is only 41,618,000,000 feet, and the average stand per acre is 4,700 feet. In 1900 there were 4,084 wage-earners employed in this industry and the products were valued at $10,352,167, as compared with 4,214 wage-earners and the products valued at $6,530,757 in 1890. There were 776,978,000 feet (board measure) of lumber, exclusive of custom sawing, sawed in 1900, as compared with 470,146,000 feet in 1890. The importance of this industry is due to the remarkable forest lands of the State, over 4,500,000 acres of which have been recently set off by the United States government as a forest reserve.

Agriculture.— In western Oregon, notably in the valleys of the Willamette, Umpqua, and Rogue rivers, the soil is a rich, dark loam. The hills have a heavier soil and the mountains are suitable only for grazing. In the eastern part, the soil is sandy in general, and contains much alkali, but is very fertile under irrigation. In the northeast, extensive areas of naturally fertile wheat lands are found; in the southeast, the cultivation of crops is of very little importance, but the land is extensively used for grazing purposes. The total number of farms in Oregon in 1900 was over 30 times as great as in 1850, and 40 per cent greater than in 1890. The total acreage has also increased rapidly, being over 23 times as great as in 1850. In 1900 the principal farm crops were corn, 317,147 bushels, valued at $180,774; wheat, 16,198,012 bushels, valued at $8,908,907; oats, 3,282,770 bushels, valued at $1,345,936; hay, 1,677,085 tons, valued at $11,404,178; potatoes, 1,692,020 bushels, valued at $761,409; and barley, 905,928 bushels, valued at 380,490. Of the total value of crops, cereals, including corn, distributed 42.5 per cent; hay and forage, 28.2 per cent; vegetables, including potatoes, sweet potatoes, and onions, 10.5 per cent; fruits and nuts, 6.7 per cent; and all other crops, 12.1 per cent. The average values per acre of the various crops were as follows: Flowers and plants, $1,653; miscellaneous seeds, $232; onions, $196; grapes, $157; nursery products, $149; small fruits, $111; sweet potatoes, $70; hops, $61; miscellaneous vegetables, $59; potatoes, $40; sugar beets, $25; orchard fruits, $13; and cereals, $8.

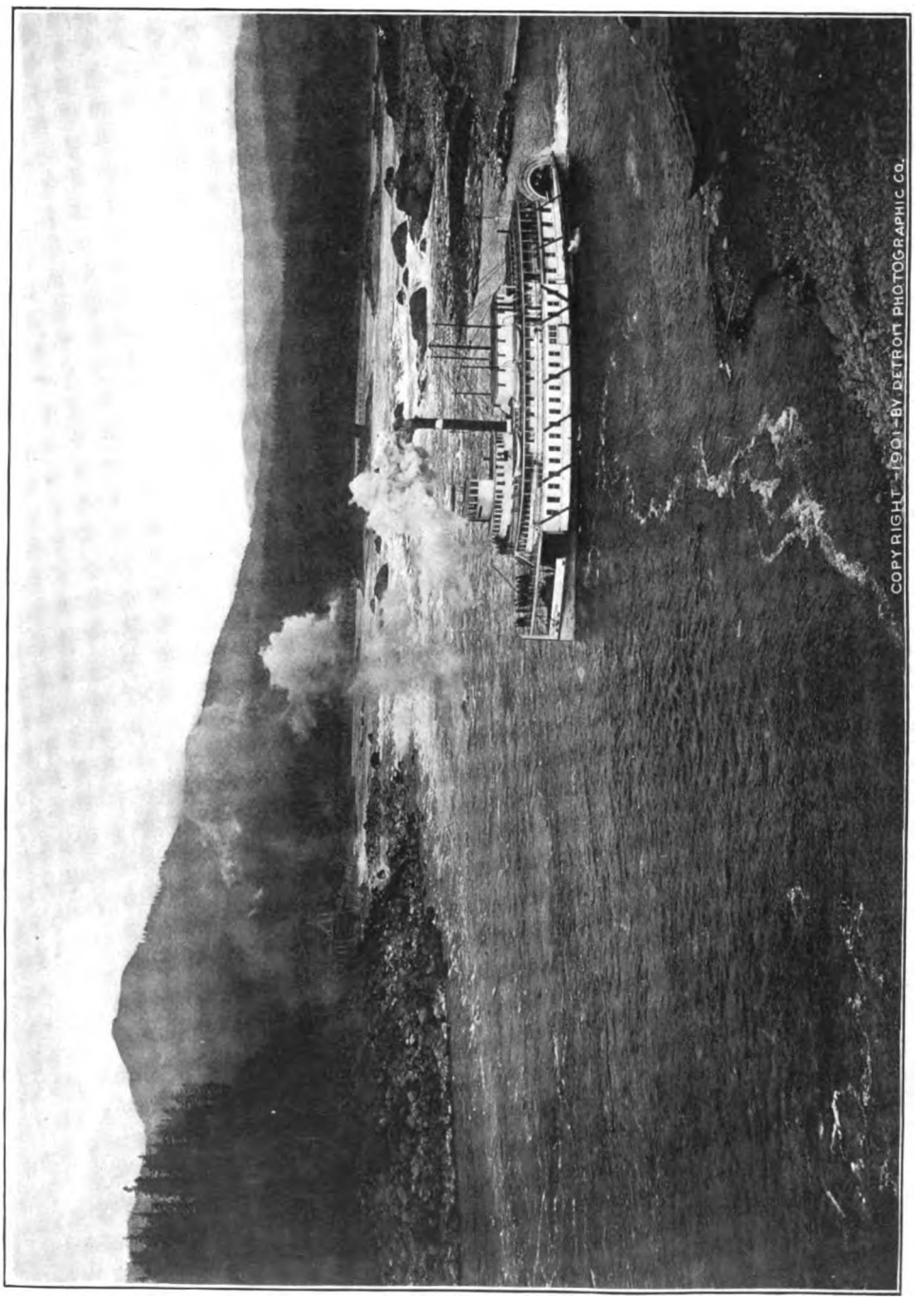
The fruit-growing industry is most extensive in the region lying between the Cascade and Coast Ranges. The value of orchard products in 1900 was $906,015, of which amount Jackson and Douglas counties contributed more than one third. From 1890 to 1900 the total number of orchard trees in the State increased from 1,757,893 to 6,314,232. Of this increase the gain in plum and prune trees constituted 49.8 per cent, and that in apple trees, 34.2 per cent. The value of all vegetables grown in the State in 1900 including potatoes, sweet potatoes, and onions, was $2,286,405. Aside from the land devoted to potatoes and onions, 15,494 acres were used in the growing of miscellaneous vegetables. Of this area 924 acres were devoted to the cultivation of cabbages; 601 to sweet corn; 573 to carrots; 372 to turnips; 331 to watermelons; 308 to tomatoes; 228 to beets; 110 to cucumbers; 101 to squashes; and 350 to other vegetables. In 1900, floral products, valued at $95,872; sugar beets, to the value of $63,332; hops, $937,513; and small fruits, $386,632, were sold by the farmers of Oregon.

PRODUCTION OF FRUIT IN 1900.

Fruits	Number of trees	Bushels of fruit
	1900	1900
Apples	2,825,898	873,980
Apricots	10,869	1,665
Cherries	237,155	65,347
Peaches	281,716	101,190
Pears	374,165	112,225
Plums and prunes	2,517,523	359,821

Irrigation.— In western Oregon there is a very heavy rainfall and irrigation is not used for general crops, but water is artificially supplied in summer by a number of truck farms, and a few cases of irrigation of hay lands (resulting in an extra cutting) are reported from the southern part of this section. The greater part of the eastern section is arid, or semi-arid, but the soil, as a rule, is very productive when there is sufficient moisture. There are numerous rivers, and the available water supply of the section as a whole is large. In the counties bordering on the Columbia River, irrigation is not generally practised, and except in occasional years of small rainfall, it is unnecessary for most crops. A greater part of the territory south and west of these counties is useful, without irrigation, for grazing purposes only. In the Rogue River Valley in Jackson and Josephine counties, hay is the only crop usually irrigated, but a number of systems have been started or projected for the purpose of supplying orchard lands with water. The total number of irrigators in Oregon in 1900 was 4,636. The total area irrigated was 388,310 acres, of which 388,111 were irrigated from streams and 199 acres were irrigated from wells by the use of pumping plants. Of the total number of crops grown on irrigated land, 69.4 per cent represents the value of hay and forage; 15.0 per cent, the value of cereals; 9.6 per cent, that of vegetables; 3.1 per cent, that of orchard fruits; 2.1 per cent, that of small fruits; and 0.8 per cent, that of other crops. The total value of the crops grown on irrigated land constitutes 7.7 per cent of the total value of farm products for the State.

Live Stock.— There is excellent pasturage in Oregon, and horses, cattle, swine and sheep are raised in large numbers. On 1 June 1900, the total value of all live stock on farms and ranges, was $33,917,048, of which 32.6 per cent represents



CASCADES OF THE COLUMBIA RIVER.

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the value of neat cattle other than dairy cows; 25.5 per cent, that of horses; 22.3 per cent, that of sheep; 12.1 per cent, that of dairy cows; 3.1 per cent, that of swine; and 4.4 per cent, that of all other live stock. The following table shows the changes since 1850 in the numbers of the most important domestic animals:

Year	Dairy Cows	Other neat cattle	Horses	Mules and asses	Sheep	Swine
1900	122,447	577,856	287,932	7,751	1,961,355	281,496
1890	114,156	406,492	224,962	4,946	1,780,312	208,259
1880	59,549	356,693	124,107	2,804	1,083,162	156,222
1870	48,325	71,872	51,702	2,581	318,123	119,455
1860	53,170	100,961	36,772	980	86,052	81,615
1850	9,427	32,302	8,046	420	15,382	30,325

The number of dairy cows in Oregon in 1901 was almost 13 times as great as in 1850, and 7.3 per cent greater than in 1890. Nearly 18 times as many neat cattle, other than dairy cows, were reported in 1900 as in 1850.

Manufactures.— Oregon is destined to become one of the great manufacturing States of the West, if not of the entire country. The natural advantages of the State are extensive, furnishing material for its various manufacturing enterprises, and its streams furnish abundant power at The Dalles, Cascades, and Oregon City. The principal industries include railroad car and shop construction, canning, flouring mills, lumber and timber, printing, publishing, shipbuilding, slaughtering, meat packing, and the manufacture of woolen goods. In 1900 there were reported by the United States census, 3,088 manufacturing establishments, employing $33,422,393 in capital, and 17,236 persons; and paying $26,099,855 for raw materials, and $8,333,433 in wages; and having an annual output valued at $46,000,587. The 16 shipbuilding plants in the State in 1900 reported 338 wage-earners, and products valued at $654,385, as compared with 14 establishments, 199 wage-earners, and products valued at $320,715 in the same industry in 1890. Flour-milling reflects the large wheat-growing interests of the State, the production of this cereal amounting to 16,198,012 bushels in 1900. The flour-milling industry gave employment to 443 wage-earners in 1900, and had a product valued at $6,364,023, as compared with 281 wage-earners in 1890 and products valued at $4,184,473. The woolen manufacture gave employment in 1900 to 697 wage-earners, and had products valued at $937,824, as compared with 358 wage-earners and products valued at $614,932 in 1890. The importance of the woolen manufacture in Oregon is largely a result of the extensive stock-raising interests of the State.

Commerce.— Before 1868, the exports from Oregon were mostly to San Francisco and Honolulu, gold dust and ores forming three fourths of the shipments. Now the exports reach almost every part of the globe, and consist largely of wheat and timber products. The foreign commerce of the State from 1890 to 1900 has fluctuated from $5,000,000 to $15,000,000, about three fourths being exports. The largest export countries are Great Britain, China, and Japan. The principal port is Portland, on the Willamette, 12 miles above its junction with the Columbia. Another port is Astoria, at the mouth of the Columbia itself. There are excellent harbors at Port Orchard, Rogue River, Coos Bay, Tillamook Bay, and Yaquina Bay. The imports of merchandise during 1900 aggregated in value $1,519,517; and the exports, $9,094,168.

Banks and Banking.— There was a private bank in Portland as early as 1858. In 1865 the First National Bank, the first west of the Rocky Mountains, was established at Portland. In 1901 there were 29 national banks in operation, having $2,395,000 in capital, $1,194,734 in outstanding circulation, and $1,154,800 in United States bonds. There were also 21 State banks, with $812,920 capital, and $114,350 surplus; and two private banks with $64,000 capital, and $1,850 surplus. The exchanges at the United States Clearing House in Portland, during the year ending 30 June 1901 amounted to $113,728,149, an increase over those of the preceding year of $11,686,839.

Transportation.— In 1865 there were but 19 miles of railroad in the State; 248 miles in 1875, and 582 miles in 1880. The total length of railroads within the State in 1901 was 1,695 miles, of which 58 miles were constructed during the previous year. Steamship lines ply regularly between San Francisco and Portland and other Oregon ports, and river lines operate on the Columbia, Willamette, and Snake rivers. The Union Pacific and the Southern Pacific are the two principal railroad lines.

Government.— New York and Iowa statutes were the models for the provisional government of Oregon, and subsequent legislation followed these lines. The governor is elected for a term of four years and receives a salary of $1,500 per annum. Legislative sessions are held biennially, and are limited to 40 days each. The legislature has 30 members in the senate and 60 in the house, each of whom receives $3.00 a day, and mileage. There are two Representatives in Congress. There is a supreme court, with appellate jurisdiction, the court consisting of five judges, who are elected for six years. There are nine circuit courts, having civil and criminal jurisdiction, and appellate jurisdiction from the county courts. There are county courts, with one judge, elected for four years, who is also judge of probate. The circuit court judges are elected one third every two years. There are also United States district and circuit courts. Justices of the peace are elected in every township or mining district, and municipal courts may be created. The constitution authorizes any male citizen of the United States, 21 years old, and 6 months a resident of the State, to be a voter, and any like foreigner who shall declare his intention to become a citizen one year before an election and shall have been a resident of the State for 6 months. New ballot laws, modeled on the Australian system, were adopted in 1891.

State Finances.— There is no public debt in Oregon, with the exception of $1,239 in unclaimed bonds. In 1901 the amount held in irreducible trust funds was as follows: School fund, $3,637,591; agricultural college fund, $157,302; and university fund, $103,046. The gross property valuation in 1900 was $125,738,761; exemptions, $7,933,887; net taxable valuation, $117,804,874; tax rate, $5.70 per $1,000. The State receipts for 1900 were $1,894,004, with an expenditure of $1,690,697. The constitution prohibits the legislature from contracting any State debt exceeding $50,000, or assuming the debt of any county, town or corporation, except for purposes of war or to suppress an insurrection. The cash balance in the State treasury in 1902 was $1,137,575.

Public Institutions.— At Salem are located the School for Deaf Mutes; State Insane Asylum; School for the Blind; Boys' Reform School; and the Oregon State Penitentiary. At Roseburg is located a Soldiers' Home.

Education.— In 1848, Congress gave the State an area of 3,387,520 acres of the public domain for free schools, and also gave 500,000 acres for a State university, and 90,000 acres for an agricultural college. The free school system has extended to every township in the State. In 1900 the children of school age numbered 111,490; the enrolment in public schools, 89,405; and the average daily attendance, 64,411. There were 2,070 public school buildings, public school property valued at $2,984,443, and 3,742 teachers. The receipts for the year amounted to $1,636,695, and the expenditures, $1,594,420. For higher education there were 14 public high schools, 19 private secondary schools, 4 private normal schools, and 9 universities and colleges for men and for both sexes. The colleges include the University of Oregon, at Eugene; Pacific University, at Forest Grove; Willamette University, at Salem; Portland University, at University Park; Tualatin Academy, at Forest Grove; McMinnville College, at McMinnville; Pacific College, Newberg; Philomath College, Corvallis; and Blue Mountain University, at La Grande. There is a State agricultural college at Corvallis, and an Indian training school at Chemawa.

Religion.— The religious denominations of the State are given in the order of their strength and influence, as follows: Roman Catholic; Methodist Episcopal; Regular Baptist; Disciples of Christ; Presbyterian; Congregational; Methodist Episcopal, South; Protestant Episcopal; and United Brethren. In 1900 there were 1,223 Evangelical Sunday-schools, with 11,863 officers and teachers and 80,017 scholars.

Indian Reservations.— There exist in Oregon the remnants of a large number of Indian tribes, most of which are aboriginal to this region, representing more than 10 distinct linguistic stocks. They have been collected largely upon five reservations, namely, Grande Ronde, Klamath, Siletz, Umatilla, and Warm Springs, while some still live along or near the Columbia River and depend upon fish and game for their support. Grande Ronde reservation is situated in the northwestern part of Oregon, in Polk and Yamhill counties, and contains an area of 93¼ square miles. Approximately 10,000 acres are arable, being a fair quality of land, lying in the small valleys along the tributaries of the Yamhill River. The Indians at Grande Ronde represent the remnants of nine small tribes: the Clackamas, Cow Creek, Lakmiut, Mary's River, Rogue River, Santiam, Umpqua, Wapete, and Yamhill, numbering in all 402. The larger number cultivate their own allotments and those of the infirm members of their families. Oats and wheat are their principal crops. Klamath reservation lies east of the Cascade Mountains, in Klamath and Lake counties, and embraces an area of 1,650 square miles. The tribes here are the Klamath, Modoc, Paiute, and Pit River, with a total population of 1,136. The Klamath and Modoc, who constitute the larger part of the population, have so intermarried that they can no longer be distinguished, and now form a single band. They are progressing in agricultural pursuits, and are giving more attention to their cattle than in former years. Umatilla reservation, comprising an area of 125 square miles, is situated in Umatilla County. Three tribes are located here, the Cayuse, Umatilla, and Wallawalla, the total population of the reservation being 1,397. Only 20 of the 65 farms on the reservation are operated by Indians, the others being leased to white men, or are the allotments of Indian families of white men who have married Indian women. Wheat is the principal crop, but barley, corn and oats are also grown. Warm Springs reservation lies in Wasco and Crook counties, in the north-central part of the State, and has an area of 725 square miles. The tribes at Warm Springs are the Des Chutes, John Day, Paiute, Tenino, Warm Springs, and Wasco, with a population of 837. Their farms are fairly well equipped with stock and implements, and a few are quite prosperous.

History.— There is much uncertainty surrounding the early explorations of the North Pacific coast. Spanish and English navigators undoubtedly reached the Oregon coast in the 17th century. Captain Cook landed at Mootka Sound in 1778, and the French navigator, Laperouse, sailed along the coast in 1786. In 1789, two Americans, John Kendrick and Robert Gray, were sent out by Boston fur merchants, and in 1791 Gray gave the Columbia River its name. In 1805–6, the Lewis and Clark expedition explored considerable of the Oregon region. (See LEWIS AND CLARK EXPEDITION.) In 1811 the American Fur Company established trading posts at Astoria. (See ASTOR, JOHN JACOB.) The northwestern boundary between the United States and Canada was fixed by the convention of 1818, as the line of 49° from the Lake of the Woods to the Rocky Mountains. West of this point the territory was to be open to both parties for 10 years. (See NORTHWEST BOUNDARY.) By the convention of 1827, ratified in 1828, joint occupation was continued indefinitely. The Oregon question (q.v.) occupied the attention of Congress from 1820 to 1824. The Methodists founded a mission under Jason Lee in 1834, and the Presbyterians, under Marcus Whitman (q.v.) in 1836. In 1839 the emigration of New Englanders commenced overland by way of the South Pass, and the Territory continued to receive settlers yearly till 1848, when the California "gold-fever" attracted a large quota of her citizens away. In 1850, however, the land-donation law, passed by Congress, had the effect of registering 8,000 citizens in Oregon, which was formally organized as a Territory 3 March 1849.

On 2 March 1853, Washington Territory was formed out of the northern half of Oregon. On 5 Nov. 1857, a State constitution was adopted; and 14 Feb. 1859 the State was admitted into the Union by Act of Congress under the constitution previously ratified. From 1845 till 1855 a desultory warfare was kept up with the Indian aborigines, and a resumption of the same occurred in 1858, and again in 1866–8, when occurred the Shoshone war, and in 1864–73, when the Modoc war prevailed. Since 1875 the Indians have been confined on the reservations. Since 1890 Congress has made numerous large appropriations for river and harbor improvements.

Politics.— Under the provisional government 1843–5, adopted by the people 5 July 1843, the executive power was vested in a committee of three persons; the legislative power was vested in a committee of nine persons, elected by the qualified electors, giving to each district representation in ratio of its population, excluding Indians; the judicial power was vested in a supreme court, consisting of one supreme judge and two justices of the peace, and a probate court. Oregon had a provisional governor (1845–9) and seven Territorial governors (1849–59). The first governor under the State constitution was a Democrat, and there have since been 4 Democratic governors, 5 Republican governors, and 1 Democrat-Populist. In Presidential elections the State is regarded as safely Republican. In 1876 it was discovered that one of the Republican electors held a Federal office, and was consequently ineligible. The Democratic governor issued a certificate to the minority candidate, but the two Republican electors filled the vacancy, and their position was sustained by the Electoral Commission (q.v.). The State elected a Democratic governor in 1903.

Population.— There are 32 counties in Oregon, as follows:

Baker,	Lane,
Benton,	Lincoln,
Clackamas,	Linn,
Clatsop,	Malheur,
Columbia,	Marion,
Coos,	Morrow,
Crook,	Multnomah,
Curry,	Polk,
Douglas,	Sherman,
Gilliam,	Tillamook,
Grant,	Umatilla,
Harney,	Union,
Jackson,	Wallawa,
Josephine,	Wasco,
Klamath,	Washington,
Lake,	Yamhill.

The principal cities and towns are as follows: Portland (90,426); Astoria (8,381); Baker City (6,663); Salem, Oregon City, Albany, Corvallis, Eugene City, Roseberg, The Dalles, Pendleton, Union, and La Grande. In 1901 there were 890 post-offices of all grades; and 193 periodicals, of which 17 were daily, 7 semi-weekly, 144 weekly, 1 bi-weekly, 2 semi-monthly, and 22 monthly. The total population of the State in 1850 was 13,294; (1860) 52,465; (1870) 90,923; (1880) 174,768; (1890) 313,767; (1900) 413,536. Of this number 65,748 are of foreign birth, Chinese 10,397, and Indians, 4,951.

Bibliography.— Barrow, 'Oregon, the Struggle for Possession' (1882); Bancroft, 'History of the Northwest Coast' (1884), and 'History of Oregon' (1888); Bulfinch, 'Oregon and Eldorado' (1866); Gray, 'History of Oregon' (1870); Greenbow, 'History of Oregon and California' (1844); Mosely, 'Oregon, Resources, Climate and Products' (1878); Mowry, 'Marcus Whitman and the Early Days of Oregon' (1901); Nash, 'Two Years in Oregon' (1882); Nicolay, 'Oregon Territory' (1846).

C. A. DOLPH,

Oregon, Ill., city, county-seat of Ogle County; on the Rock River, and on the Chicago, Burlington & Quincy railroad; about 85 miles in direct line west of Chicago. It has considerable manufacturing interests. The chief manufactures are foundry and machine-shop products, flour, pianos, street-sprinklers, and dairy products. It has good schools and a public library. Pop. (1890) 1,566; (1900) 1,577.

Oregon, a river in the western part of North America. See COLUMBIA.

Oregon, University of, the State University chartered in 1872, and opened in 1876 at Eugene. Its organization comprises (1) the College of Literature, Science and Arts, which offers courses in law, journalism, business, and pedagogy; (2) the College of Science and Engineering, with courses in civil, chemical, electrical, mining, and sanitary engineering; (3) the School of Music; (4) the Graduate School; (5) the School of Law (founded in 1884); (6) the Medical School (founded in 1887); the two latter are located at Portland; there is also a University Academy. The bachelors' degrees conferred are A.B. and B.S. The University is coeducational, number of women students being about 30 per cent of the total. It is supported mainly by State appropriation; tuition is free; the income in 1903 was $59,702. The library (1903) contains 15,500 volumes; the students number 470, and the faculty 71.

Oregon City, Ore., county-seat of Clackamas County; on the Willamette River, and on the Southern Pacific railroad; about 14 miles south of Portland. The falls in the river, 40 feet in height, furnish extensive water-power which is used for the electric-light works and for the development of manufacturing industries. The chief manufactures are flour, lumber, woolen goods, soap, paper, pulp, and furniture. It has a House of the Good Shepherd, public and parish schools, and a public library. The city owns the waterworks. Pop. (1890) 3,062; (1900) 3,494.

Oregon Brook-trout, the rainbow trout (q.v.).

Oregon Question, The. The Oregon question of boundary between the United States and Great Britain involved the right to the territory upon the Pacific coast of North America extending inland eastward to the Stony, now called Rocky Mountains, and bounded upon the south by the parallel of 42° north latitude, upon the north by the parallel of 54° 40′ marking the southern limit of what was formerly Russian America. The claim of the United States to this territory was based upon the discovery, 11 May 1792, of Captain Robert Gray of Boston, who, in the ship Columbia, entered the river called Oregon by the Indians. "He passed its bar and anchored in the river, ten miles above its mouth," and "afterwards sailed up the river 12 or 15 miles and left it on the 20th of the same

month, calling it Columbia after his ship.» (J. C. Calhoun.)

A second claim was based on the exploration of Meriwether Lewis and William Clark sent out with a party by the United States government, in 1804, across the newly purchased Louisiana territory. They followed the Missouri River to its headwaters, crossed the Rocky Mountains, reached the Columbia River and followed it down to the Pacific. They encamped on the north side of the mouth of the Columbia, on Cape Disappointment, wintering there. 1805–6, and returned to Saint Louis in September 1806. «It was this important expedition which brought to the knowledge of the world this great river, the greater by far on the western side of this continent, with its numerous branches, and the vast regions through which it flows above the point to which Gray and Vancouver had ascended.» (Calhoun.)

Priority of settlement was claimed for the United States on account of the settlement made by the party sent out under the Company of which John Jacob Astor was the head. «Early in the spring of 1811, they made their establishment on the south side of the (Columbia) river, a few miles above Point George.» (Calhoun.) Great Britain took this post and others in 1812 after the beginning of war between the United States and Great Britain. By the first article of the Treaty of Ghent, 1814, which terminated the war, the posts were restored to the United States, the formal transfer occurring in 1818.

Our last item of claim was based on the Treaty of Louisiana in 1803, with France, and the Treaty of Florida in 1819, with Spain. By the latter, Spain conveyed to the United States all her rights, claims and pretensions to the country west of the Rocky Mountains and north of the 42d parallel. By the Treaty of 20 Oct. 1818, between the United States and Great Britain, the boundary line between the United States and British America was fixed on the 49th parallel from the Lake of the Woods to the Rocky Mountains. West of the Rocky Mountains, the line was not defined, but it was agreed that the Oregon country with its harbors, bays and rivers, be open for the term of 10 years to the vessels, citizens and subjects of either power. The boundary was left unsettled and the agreement above specified was renewed in 1827 except that the time was left indefinite and the agreement terminable at the discretion of either power upon a 12-months' notice to the other. The country in question was a wilderness traversed by the hunters and trappers of the Hudson Bay Company and the Indians, the possession of which was not considered an issue of the first importance. In 1843 President Tyler's annual message called the attention of Congress to the Oregon boundary and stated the United States claim as embracing the country from the 42d parallel to that of 54° 40′.

The claims of Great Britain were similar to the claims of the United States. In 1778, the English Captain Cook visited and explored the northwest coast of America from latitude 44° northward. In 1792, 1793, and 1794, Captain Vancouver, for the English, surveyed the coast and its adjacent islands. In point of «accuracy and authenticity» these discoveries were said to be superior to those of any other country.

«In 1793 Mackenzie, a British subject, had crossed from the Rocky Mountains to the Pacific, exploring the upper waters of Fraser's River, which in process of time was traced to its junction with the sea near the 49th degree of latitude, thus forming in point of exploration a counterpoise to the exploration of that part of the Columbia which was first visited by Lewis and Clark.» (R. Pakenham.) An English expedition intended to anticipate the Astoria settlement, was a little late, not reaching Astoria till July 1811. Great Britain denied the validity of the Spanish claim to the Oregon country, practically on the ground that she was so much stronger than Spain that Spain could not make good her claim. The above claims and counter claims, with various modifications, were discussed at times by the diplomatic representatives of Great Britain and the United States from 1826 to 1846.

The Oregon question as an issue in American politics was made prominent by a plank in the platform of the national convention of the Democratic party at Baltimore, the latter part of May 1844, which read, «Resolved, That our title to the whole of Oregon is clear and unmistakable, that no portion of the same ought to be ceded to England or any other power, and that the reoccupation of Oregon and the reannexation of Texas at the earliest practicable period are great American measures which this convention recommends to the cordial support of the Democracy of the Union.» The words reannexation and reoccupation implied that the territory in question had belonged to the United States, Texas under the Louisiana purchase and Oregon by discovery, exploration, etc., till the United States left the claim to sovereignty over Oregon in abeyance by the convention of joint occupancy with Great Britain. It must be recognized that in 1844 the United States had no undisputed sovereignty over the territory on the Pacific coast now belonging to the United States. Joint occupancy with Great Britain of the Oregon country was not sovereignty over it. The California country belonged to Mexico. If the sovereignty of the United States was to extend from ocean to ocean, that power must acquire the California country from Mexico or exclude England from Oregon. The settlement of the Oregon boundary had been discussed for some time previous to 1844 and it had been hoped that the treaty which was negotiated in 1842 between Mr. Webster and Lord Ashburton, fixing the line between Maine and Canada, would also fix the Oregon line, but such was not the case. James Buchanan, in a speech in the Senate, 12 March 1844, upon a resolution requesting the President to give notice of the termination of the joint occupancy of the Oregon country, pointed out clearly that England leased that territory to the Hudson's Bay Company in December 1821 for 21 years and in 1838 renewed the lease for 21 years more; that the Hudson's Bay Company had 6 permanent establishments on the coast, 16 interior, and several migratory hunting parties, 6 armed vessels, one of them a steamer; that they hoped to keep British interests on the ascendant in the Pacific. Mr. Buchanan also showed that Great Britain was content to keep the *status quo* and that the only way to force her to act was to give the notice. The plank in the Democratic platform was considered de-

cidedly aggressive in some sections of the country. As might have been expected, New England and the sections whose cities and shipping would be more at the mercy of the enemy in case of war were not so enthusiastic for an aggressive foreign policy as those States in the centre, west and south of the Union which were more remote from the "firing line" and which were deeply interested to see the flag of the Union sweep through from "sea to sea." The discussions in Congress revealed calculation of the probabilities of war as the result of the notice. It was urged that Ireland was hostile to England and there might be a rebellion. Far more important was the fact that England received nine tenths of her cotton from the southern United States, that war would cut off this supply and close the English mills with all the social distress involved, to say nothing of the loss of the market the United States afforded for English manufactured products. In 1844, one third of the foreign trade of the United States was with Great Britain. After Mr. Polk's nomination, it was brought out in the proceedings of Congress in June 1844, that so far back as the session of 1828–1829, he had laid out a definite plan of policy for the United States including giving the notice and taking the consequences. When, therefore, Mr. Polk was elected in November 1844, the Democratic party considered its platform approved by the country and it proceeded to carry out its policy of territorial aggrandizement. The cry of "54° 40′ or fight" phrased the ultra aggressive sentiment on the part of the United States looking to push its territory to the Russian line, while Great Britain seemed equally determined to force the line of the Columbia River. War with Great Britain might involve the loss to the United States of all the Pacific coast. Mr. Blaine in his 'Twenty Years of Congress' attributes the emergence from a difficult situation to the foresight and ability of Mr. Calhoun and of Mr. Buchanan. These gentlemen as well as Mr. Clay and Mr. Webster, when occupying the post of Secretary of State, had been willing to continue the line of 49° to the Straits of Fuca. There were serious objections to the Columbia River line. The most important of these, barring considerations of national honor and pride, was the fact that there were no good harbors in the territory left to the United States south of the Columbia, whereas, if the line ran, as it does at present, on the 49th parallel to the Straits of Fuca, all Puget Sound with its waters sheltered from the storms of the Pacific and its branches accessible to a very large territory, would belong to the United States. San Francisco harbor then belonged to Mexico. Within the United States, sentiment was divided. War with England would hurt the South seriously by cutting off her cotton market and possibly limiting what might become slave territory to the Southwest. The anti-slavery sentiment of the North had defeated Mr. Clay for the Presidency for his willingness to compromise on an issue on which it would brook no compromise. President Polk was a friend of General Jackson and peace was not an idol at whose shrine Jackson worshipped. The influence of other public men looking toward peace, their interests and rivalries, were to be considered. The Administration escaped from its "54° 40′ or fight" position by taking the advice of the Senate in advance of the treaty. This course, unusual and in some cases highly undesirable, shifted the responsibility for action upon the shoulders of the Senate, at the same time allowing the Secretary and Great Britain to feel that the instructed action of the Secretary could not consistently be rejected by the Senate. It cleverly rescued the Administration, for if the Whigs insisted upon the line of 54° 40′, they put themselves squarely upon democratic ground. If they were willing to compromise on 49° for the sake of peace, it would hardly seem reasonable to taunt the Democrats with cowardice for acting upon Whig advice. When the resolution of notice passed the House in February 1846 "the country at once became alarmed by the growing rumors that the resolution of the House was a direct challenge to Great Britain for a trial of strength as to the superior title to the Oregon country." (J. G. Blaine.) The resolution, amended by the Senate and given a conciliatory tone, passed Congress 23 April 1846. By that time the Administration must have seen its future course clear, for by the middle of June the diplomatic representatives of Great Britain and the United States had come to an agreement which was ratified by the respective countries and proclaimed in force in August 1846. The line agreed upon was the parallel of 49° to the Straits of Fuca, thence following the middle, roughly speaking, of that Strait to the Pacific. War with Mexico broke out contemporaneously with the passage of the amended Oregon notice to Great Britain and as a result of the war with Mexico and the Oregon treaty with Great Britain, the United States acquired its present sovereignty over the great territory west of the Rocky Mountains with a frontage of some 1,500 miles on the Pacific.

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Oregon Robin. The "varied thrush" (*Merula nævia*) which represents the eastern robin in Oregon and northward to Alaska west of the mountains. It is dark slate-blue above and orange-brown in the lower parts, with a crescent of black on the breast, from the horns of which a line of black leads along the neck and through the eye. It makes its nest in bushes, and lays greenish blue eggs, clearly marked with spots and points of dark brown. It is a sweet singer.

Oregon Snow-bird. See Snow-birds.

Oregon State Agricultural College, founded in 1870 at Corvallis. The four years' courses include agriculture, domestic science, mechanical, electrical, and mining engineering, and pharmacy, there are also a two years' course in mining, a two years' business course (added in 1901), and a winter course of four to six weeks in agriculture; and a preparatory department with a one year's course. The college is coeducational, and there are women on the faculty. The Experiment Station is connected with the college, though separately supported; and farmers' institutes are organized under supervision of the faculty; in 1901, 11 such institutes were held with an attendance of 3,100. The income is derived chiefly from the land grant fund of 1862, and from Federal and State appropriation; tuition is free; in 1903 the annual income

amounted to $86,533. In that year there were 480 students in attendance, and 30 members of the faculty.

Oregon Sturgeon. See STURGEON.

O'Reilly, ō-rī'lĭ, **Alexander,** Spanish soldier: b. Dublin 1725; d. Murcia 23 March 1794. He entered the Spanish army when a boy, fought the Austrians in Italy, joined the Austrian army in 1757, and the French in 1759, and then returned to Spain. He served in the war with Portugal (1762), acted as governor of Havana, rebuilding the fortifications dismantled during the British occupation, became governor of Louisiana in 1769, and acted there with great severity until his authority was established, when he showed himself attractive and liberal. He was governor of Madrid during the rising of 1765, commanded an unsuccessful expedition to Algiers in 1775, but still retained the king's favor. After the death of Carlos III. (1788) he was disgraced and retired from the army; he was subsequently appointed to the chief command of the Spanish army in 1793, but died suddenly before reaching his army.

O'Reilly, John Boyle, Irish-American author and journalist: b. Dowth Castle, County Meath, 28 June 1844; d. Hull, Mass., 10 Aug. 1890. He was apprenticed to a printer at nine, became a compositor and a reporter, and was an active member of the Fenian Society, in whose interests he enlisted in May 1863 in the 10th Hussars. Three years later he was tried for treason and sentenced to death, a sentence commuted to 20 years' penal servitude. From Dartmoor he was transported in 1867 to Australia, whence he escaped and, having been picked up by an American ship, made his way to Philadelphia, where he was naturalized. He removed to Boston almost immediately, and became editor of the 'Pilot' in 1870 and part owner in 1876. He accompanied the Fenian raid of 1870 as press correspondent, and was a prominent advocate of Home Rule for Ireland. He wrote some good verse, notably that on Australian themes: 'Songs of the Southern Seas' (1873); 'Songs, Legends, and Ballads' (1878); 'America' (1882), and 'In Bohemia' (1886); and in prose, 'Moondyne,' a novel dealing with penal life (1879); 'The King's Men' (1884, with Robert Grant, 'J. S. of Dale,' and J. F. Wheelwright); 'The Irish Question' (1886); 'Ethics of Boxing and Manly Sport' (1888), and 'Stories and Sketches' (1888). Consult the biography by Roche (1891).

Orel, ō-rĕl, or **Orloff,** Russia, (1) a town, capital of the government of same name, on the Oka, 201 miles southwest of Moscow. It consists of narrow streets and houses built principally of wood, and has manufactures of linen, tanneries, rope-works, worsted-mills, etc. It is well situated for trade, communicating by water with the Black Sea, the Caspian, the Baltic, and forming an important entrepôt, especially for Saint Petersburg and Moscow. Pop. (1897) 69,858. (2) The government has an area of 18,060 square miles, the surface being diversified with hill and valley, and watered by the Oka, the Desna, the Don and its tributary the Sosna. Stock raising and agriculture constitute the chief industries. Pop. (1897) 2,054,749.

O'Rell, Max. See BLOUET, PAUL.

Orellana, Francisco, frän-thēs'kō ō-rĕl-yä'nä, Spanish explorer of the Amazon: b. Truxillo, Spain, about 1500; d. Brazilian Guiana 1550. He was a friend and fellow townsman of Pizarro, fought under him in Peru, founded the city of Guayaquil in 1537, and in 1540 accompanied the expedition across the Andes in search of El Dorado, and sailed down the Napo River with a few men to the Amazon, which he followed to its mouth, and, because of the stories he heard of women warriors and women chiefs along its course called it the Amazon. Upon his return to Spain he told amazing stories of the richness of the country he had explored and received its government in 1544. He was killed soon after his return to South America, where his expedition was entirely unsuccessful. Consult the contemporary account of his travels by his chaplain, Gaspar de Carvajal, reprinted at Seville in 1894.

Orenburg, ō'rĕn-boorg, Russia, (1) a town, capital of the government of the same name, on a slope above the right bank of the Ural, 990 miles southeast of Moscow. It has spacious and regular but ill-paved streets. The principal buildings are several stone churches, two mosques, a governor's house, exchange, custom-house, merchant-house, and Bashkir caravansary. The chief manufactures are woolens, partly for army clothing, leather, and soap. There are also many large tallow-melting houses. The trade, carried on principally by caravans from Khiva and Bokhara, is very extensive. Pop. (1897) 72,740. (2) An eastern government in the southern Urals, with an area of 73,816 square miles. It has celebrated deposits of gold, copper, silver, coal, iron, and salt, which are extensively worked. Pop. (1897) 1,609,388.

O'reodonts, an extinct family (*Oreodontidæ*) of ungulates, the remains of which occur in the early Tertiary deposits of North America, and are among the most primitive of hoofed mammals. Their skeletons abound in the Lower Miocene formations of Colorado and northward, especially in the White River beds. They are mainly animals not larger than sheep, with a very long tail, and with four functional toes on each foot. The dentition is usually complete, though the incisors are sometimes rudimentary or even wanting in the upper jaw; and all the genera exhibit, says Woodward, one very peculiar feature, namely, the degradation of the lower canine to the rank of an incisor, while the foremost premolar is enlarged to usurp its function in opposing the moderately large upper canine. The best known genera are *Oreodon* and *Agriochœrus* of the eastern foothills of the Rockies, and the larger *Eporeodon* of the Pacific coast. Consult Woodward, 'Vertebrate Palæontology'; Osborn, 'Evolution of the Ungulate Foot,' Trans. Amer. Philosophical Soc., U. S., Vol. XVI. (1889); Cope, 'The Artiodactyla,' Amer. Naturalist, 1888, and 1889.

Oreopith'ecus, the generic name given to the oldest known fossil ape, fragments of whose skeleton (jaws and teeth) have been recovered from the Middle Miocene of Tuscany. They are interesting as exhibiting a comparatively large animal (*O. bamboli*), showing resemblances both to the *Cercopithecidæ* and to the *Simiidæ*,

«as if,» remarks Woodward, «they represented an annectant ancestral type.»

Orestes, ō-rēs'tēz, in Greek mythology, the son of Agamemnon and of Clytemnestra. In several Greek tragedies he is represented as the deliverer of his sister, and the avenger of his father, by becoming the murderer of his mother. Orestes, saved by his tutor with the assistance of Electra from the fate of his father, was brought up in the house of his uncle Strophius, prince of Phocis, and formed with his son Pylades that intimate friendship which has become proverbial. Called upon by the Delphian god to avenge his father, he hastens back to Mycenæ. To conceal himself he has recourse to artifice. His tutor and Pylades appear with an urn, which they pretend contains the ashes of Orestes. Clytemnestra hears the news of her son's death with a joy which she can hardly conceal; but she soon falls under his dagger. Ægisthus undergoes a similar fate. According to the Greeks, the murderer of his mother became a prey to the Eumenides or Furies. These terrible goddesses unrelentingly pursue the unhappy prince, and at last drive him to madness.

Orfila, ôr-fē-lä, **Mathieu Joseph Bonaventure,** French chemist, founder of the science of toxicology both in its therapeutic and legal bearings: b. Mahon, Minorca, 24 April 1787; d. Paris 15 March 1853. He served in the merchant marine, studied medicine at Valencia, Barcelona, and Madrid; was sent to Paris by the Spanish government in 1807; and after the loss of his pension consequent on the war between France and Spain lived there in poverty for a time. By 1811 he had become doctor of medicine, and his successful practice and marvelous knowledge of chemistry made him quickly famous. He was naturalized, became professor of toxicology (1819) and of chemistry (1823), and was dean of the medical faculty from 1830 to 1848. He was famed as an expert witness, did much to reform French medical education, and wrote: 'A Treatise on Poisons' (1813); 'Treatise on Legal Medicine' (1847); 'Elements of Medical Chemistry' (1817); 'Treatise on Exhumation' (1830), his most able work; and 'Researches on Arsenious Acid Poisoning' (1841).

Orford, ôr'fôrd, **Earl of.** See WALPOLE, SIR ROBERT.

Or'gan, a functional part of living being. It is an essential quality of a living being (see LIFE) that it shall exhibit activities, the expression or product of organic constitution. Hence, in fact, living beings are said to be organic or to have organization as distinguished from the homogeneous, non-vital character of gases and minerals, which are inorganic. Any living being, either vegetable or animal, is hence termed an organism — the broadest possible name for the animate world as opposed to the inanimate.

Historical Sketch.— The erroneous notions which formerly prevailed in regard to the nature of organic functions belong to the history of the science of physiology and of chemistry, and need not be dwelt upon here further than is necessary to clear up the present meaning of certain terms. Up to the early part of the 19th century it was believed that certain chemical compounds which were produced as the results of vital processes occurring within the tissues of animal and vegetable organisms could not be obtained by the ordinary methods of the chemical laboratory; and these compounds were, for this reason, designated as organic. Wöhler, in 1828, however, discovered that urea, the most important solid constituent of urine, could be obtained «artificially,» as it has been called, from inorganic materials. Since that date a very large number of so-called organic compounds have been prepared artificially, so that the original signification of the term «organic» does not hold any longer; and the old conception of an organism as an engine-like collection of organs with fixed functions is disappearing before the doctrine that it is the protoplasm or living stuff in all parts of the body that is the basis of all vital activities. The title «organic chemistry» is now commonly applied to the chemistry of the compounds of carbon, whether these compounds are obtainable only as the products of vital processes or not.

Nature of Organs.— Organs may be spoken of in two senses. In common speech they are large functional parts of gross anatomy, such as the roots, the leaves, or the blossoms of plants, the limbs, the heart and blood-vessels, the lungs, the stomach, the liver and excretory glands, the generative parts, etc., of animals; these are termed, properly enough, the respiratory, digestive, locomotive, or reproductive organs, and so on. But each is made up of many parts which unite to effect the great functions which characterize the group as a whole, and all are more or less interdependent. The number and diversity of these structures, large and small, visible and invisible, vary enormously in different plants and animals, and are the result of an organic evolution, that is, a struggle for existence among organs, or intra-evolution, as it has been termed by some German naturalists. Where the organs are few and simple, in some cases more than one distinct function being performed apparently by the same part, the animal or plant is said to be of simple or synthetic structure or organization: where the subdivision of labor in the organism is extensive, separate structures doing each a more particular work for the benefit of the whole, the organization is said to be complex or specialized. Increase of specialization is regarded as an advance, hence we speak of «lower» and «higher» animals, referring to the less or greater degree of complexity and specialization of their organs, or comparing their organizations as a whole. Comparison of existing organisms, considered with reference to their activities, and a study of the phylogeny of animals and plants as revealed by palæontology and embryology, establishes the truth of this standard of comparison, and throws light upon the evolution of organs. Tracing backward any particular group, as, for example, that of the digestive system, we find it less and less complex as we descend the scale of organization until we arrive at the simplest forms — the one-celled moners (see MONER; PROTISTA), in neither plant nor animal, which have no structure that our power is able to detect, the drop of undifferentiated protoplasm which constitutes their whole being accomplishing all the work of nutrition, locomotion and reproduction. A little higher stands the amœba (q.v.) and other protozoans and protophytans, in which a beginning of differentiation and

structure appears in the presence of a nucleus, a vacuole, microsomes, etc. Still higher stand the sponges, cœlenterates, and so on, whose comparative superiority is manifested by the assignment of certain parts with gradually increasing definiteness to perform distinct offices. But the higher organisms primarily differ from the lower ones only in the fact that they are composed of many cells in more and more complicated arrangement, while the lowest consist of only a single cell; hence in the last analysis, an organ can be defined only as a cell or group of cells devoted to doing a special part of the labor required for the continued life, activities, and prosperity of the organism. This is only a corollary of the general doctrine of the cell as the seat of life (see CELL). Of the origin of function or organic activity we know nothing.

Form and Symmetry.— Returning now to the ordinary sense of the word "organ" as a functional part, certain general facts may be considered. Among these are the form and symmetry of organs. The form is determined by the work to be done, the organ as an instrument assuming that shape and relative position in the body, and acquiring that structure, which will be most effective for the purpose. Many of the problems here which seemed so difficult to early investigators have been solved by the application of mechanical laws. Mechanical principles, controlling, to begin with, the original cell-division of the egg, and regulated in growth by external conditions, as gravity, air or water pressure, strains, muscle-leverage, etc., are no doubt at the basis of the symmetry which so remarkably characterizes the arrangement of organs throughout the living world. Two general types may be recognized — radial symmetry and bilateral symmetry. The former is most characteristic of plants, where the majority of organs occur in circles around an axis (see ANATOMY OF PLANTS; FLOWERS; PHYLLOTAXIS; VENATION; etc.); and of such animals as the echinoderms, cœlenterates (qq.v.), and many worms, whose organs are radially disposed about an oral-aboral axis, as in polyps and starfish. The superior orders generally, and the arthropods and vertebrates particularly, display bilateral symmetry in a marked degree in all their outward parts, the external organs being in pairs (with one important exception in the higher forms) and these approximately, though not absolutely, alike. The internal organs of the vertebrates are by no means symmetrical at present, although they seem to have reached their asymmetry by evolution from a primitive paired condition. In insects and arthropods generally the internal parts show much more bilateralism. Among mollusks the bilateral arrangement of the organs is normal, but one side is often developed at the expense of the other, even to the complete loss of the latter.

Correlations.— As might be expected under such circumstances certain definite correlations exist between organs as to size and relative proportions. Thus in the human frame, the limbs are equal in length, the head is one seventh of the total height, the internal organs must be of a relative size in respect to one another and to the frame, and so on. This symmetry and correlation of organs is necessary to the continuance of healthful interacting functions.

At the same time homologous parts — that is, those structurally alike — may vary greatly among animals of the same class, according to the varying requirements of habits and environment, as for instance among vertebrates, the locomotive organs are in the form of fins or paddles for aquatic species, wings for aërial creatures, and legs and feet for those of terrestrial habit; and these may be vastly modified among the different groups, adapted to diverse habits, giving all the difference, for example, between the massive, shovel-like, digging-paws of the mole and the long slender legs of the antelope, or even the total disappearance of homologous parts, as in the snakes and limbless lizards. Such alterations of form adaptive to the requirements of environment and habit, come about gradually, and are likely to require a corresponding change in other organs, directly or indirectly; since all or many organs in the frame are dependent upon the co-action of others, and conditions of space, gravity, etc., require mechanical as well as physiological conformity. The stomach, lungs, etc., of a long slim animal will be elongated and narrow, while those of a related but more compactly built species will be more globular. Sometimes, however, the changes render some secondary organ unnecessary, and it continual disuse results in its gradual reduction and perhaps extinction, as has happened in the case of the loss of eyes by many burrowing or cave-dwelling animals. When such a loss has become permanent in a type the remains may occur only in the embryonic stage, or may exist in adulthood, quite useless to the animal in its present condition. Such obsolete structures, of which the false hoofs of many ungulates, the "balancers" of flies, and the appendix vermiformis in man are examples, are called vestigial organs, and were most difficult of explanation until this relationship was recognized.

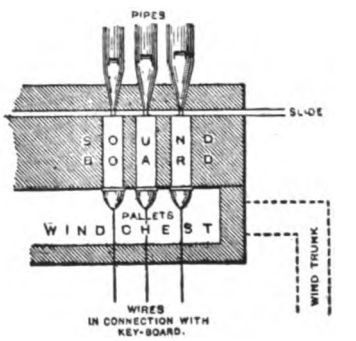
Function Change.— Organs may not only change their form, but may also change their function. Many perform more than one function, even in the higher animals, and often, especially in the case of the limbs, this has produced a change of form as between the fore and hind limbs, relegating to one pair, say the hind limbs, the main work of progression, while the other pair assist in this respect only a little, but serve mainly as the means of seizing and holding food; most of the rodents afford examples of this case, of which the kangaroos and iguanodons are extreme instances. But function-change has often been more radical, the original or primary service by an organ having been completely superseded by some other service, to accomplish which the organ underwent gradual transformation in accordance with change of habit and the arising of a novel bodily need to which existing machinery could be adapted. The origin of lungs in air-breathing amphibians, reptiles, and warm-blooded mammals and birds is directly traceable to the transformation for this new purpose of the swimming-bladder of fishes; teeth came into existence as a relic of the hard scales of ancient fishes whose function was purely as an armature, the structure and office surviving only in a few such forms as the gar (see GAR); the three pairs of "jaws" of crabs are structures which, in the early history of the

crustacean type were primarily swimming and breathing organs, but long ago lost those functions altogether and became fitted wholly for mastication of food. Similar examples in great number might be drawn from both animals and plants. Indeed, it might be said that most if not all of the successful and persistent variations have involved change of function on the part of organs, the result of which in many cases was greater specialization.

For development of organs in the embryo see EMBRYOLOGY.

ERNEST INGERSOLL.

Organ (Gr. ὄργανον, Lat. *organum*, an instrument), a name at the present time applied to several musical instruments that are in construction and principle somewhat closely allied; but more distinctively appropriated to the largest of these, the church organ, which may be briefly described as a wind instrument, the sounds of which are those of a great number of pipes of varying lengths, and are produced by the admission to these (as determined by the keys and stops moved by the performer) of compressed air conveyed to them along certain channels, from a bellows worked by electricity, human or other motive power. This, which from its essential feature of construction is also named the pipe organ, and, from the mode of playing, the finger organ, is incomparably the noblest and most imposing of musical instruments, being in majesty of tone and grandeur of effect quite without a parallel. As in the human voice, the tones of the organ are produced by the vibrations of the air in the tubes or pipes through which it is propelled. The three essentials of an organ are: (1) a chest of compressed air; (2) a set of pipes in communication with this chest; and (3) a clavier or key-board, by means of which this communication may be opened or closed at pleasure. The air is forced into the wind-chest by means of bellows. To the upper part of each wind-chest is attached a sound-board, a contrivance for conveying the wind to any particular pipe or pipes at pleasure. It consists of two boards laid horizontally. On the upper board are arranged parallel rows of pipes, the pipes in each row, regarded longitudinally, being of the same timbre or quality of tone, but of a different quality when regarded laterally, that is, as they extend backward. Under each lateral row of pipes there is a groove or channel in the sound-board for the passage of air from the wind-chest to the perforations in the sound-board by which the pipes communicate with the grooves. Air is admitted into these grooves by means of valves or pallets, which are connected with the keys. On the depression of a key the valve is opened, and the compressed air rushes into the groove, and would, it is obvious, cause all the pipes communicating with that particular groove to sound their respective notes were it not for the register. The register is a slider which moves in other grooves in the sound-board, cut at right angles to those above mentioned, and communicating by perforations with the longitudinally arranged pipes; it contains holes to correspond with these pipes. By drawing the register or stop the holes of one of these rows are opened, as then the holes of the slider are directly under the entrance to the pipes, and by pushing it they are closed. From this it is clear that by drawing several of these registers corresponding rows of pipes are opened. When a register is open air can be admitted into any of the row of pipes under which it is placed by simply pressing the key that opens the valve of the groove with which it communicates. The series of pipes above each slider is called a stop. The principal stops of an organ are the open, stopped, and double diapasons; the principal, dulciana, twelfth, fifteenth, flute, trumpet, clarion, bassoon, cremona, oboe, and vox humana. Those pipes of the various registers that open into each channel are so constructed that while one shall give a fundamental note, the others shall give the chords of that note. An organ may have several wind-chests filled by the same bellows, and several key-boards, each key-board and wind-chest representing a distinct organ. In the largest instruments the number of these organs generally amounts to five. The most powerful of these is called the great organ; a smaller one the choir organ; another is called the swell organ, from the circumstance of its



Organ — Internal arrangements.

being enclosed in a wooden box with a front of louvre-boards, which can be worked by the player so as to give diminuendo and crescendo effects to the sound; a fourth is called the solo organ, being employed for special solo stops, such as the hautboy, the flute-stop, the vox humana, and others; lastly, there is the pedal organ, so called from its key-board being played by the feet. The key-boards for the hand are termed manuals, that for the feet the pedal. The most usual compass of the manuals is from CC (8 feet) to F in alt, four octaves and a half; that of the pedal from CCC to E or F, two and a quarter to two and a half octaves.

There are two kinds of organ pipes — flute pipes and reed pipes, of each of which there are several species. Flute pipes consist, first, of a foot, which is hollow, and receives the wind that sounds the pipe; second, of a body which is attached to the foot. Between the foot and the body of the pipe is a diaphragm or partition, having a small narrow aperture to let out the wind; over this aperture is the mouth, whose upper lip, being horizontal, cuts the wind as it escapes through the aperture and sets it in vibration, so causing the sound. The pipes are made either of pewter, of lead mixed with tin, or of wood. The metal pipes are generally cylindrical, open at their extremities, and clear in their sound. The wooden pipes are square

and generally stopped at their extremities by a plug covered with leather, so as to be air-tight. The sound of these is softer. The longest pipes yield the gravest, the shortest, the most acute sounds. The pipes, however, which are stopped have only half the length of those that are open, for the same sound. The pipes vary in length from 32 feet or so, to the size of the pipe of a very small key. The reed pipes consist of a foot to carry the wind to the reed, a thin tongue of hard brass, one of the extremities of which is fitted into a kind of mold by a wooden plug, and the other is left free to vibrate; and in proportion to the length of that part of the tongue which is at liberty is the depth of the sound. After passing the reed the wind traverses a long pipe, whose dimensions and shape give character and quality to the sound.

The hand or barrel organs consist of a movable, turning cylinder, called a barrel, on which, by means of wires, pins, and staples, are set the tunes it is intended to perform. These pins and staples, by the revolution of the barrel, act upon the keys within, and give admission to the wind from the bellows to the pipes. The hand-organ is generally portable, and so contrived that the same action of the hand which turns the barrel gives motion to the bellows.

The invention of the organ is attributed to Ctesibius of Alexandria, about 200 A.D. An organ was presented by Emperor Copronymus to Pepin, king of France, about 755; and in 826 a water-organ was erected at Aix-la-Chapelle. The use of organs, however, was not common before the 14th century. At the beginning the instrument was very imperfect; it had only from 12 to 15 broad and large keys, which were struck with the fist and produced the tones of the diatonic scale. The keys in time became smaller, and between the diatonic tones the semitones were inserted. In 1444 H. Drossdorf of Mayence built a great organ with a pedal. According to others, Bernhard, a German, organist to the Doge of Venice, built the first organ with a pedal between the years 1470 and 1480. Improvements succeeded quickly in the 16th century; the division of all the pipes into different stops was now invented, and the tone of the instrument was adapted to the tone of the choir. The bellows were particularly improved, as till then 20 to 24 pairs had often existed in one organ, requiring from 10 to 12 men to tread them. But the present degree of perfection could not be obtained until Christian Forner had invented in the 17th century the wind-chest, by which an equal pressure of wind can be obtained in all the bellows. A hydraulic engine has been adapted, with success, to the purposes of working the bellows, and it is now pretty generally adopted. By an ingenious piece of self-acting mechanism, the pump works only when the wind-chest is empty, or only partially filled, ceasing when it is full. Mr. Barker, inventor of the pneumatic lever, patented in 1863 a contrivance for transferring some of the work from mechanism to electro-magnetism. An organ built on this principle is termed an electric organ. Several improvements have since been made on Barker's patent. The first electric organ constructed in Great Britain was used at Drury Lane in 1867, and many others have since been erected throughout the world. The principal advantages of this description of organ are that it facilitates the playing, and enables the organist to sit at a key-board at a distance from the organ. One of the largest organs is that in Saint Peter's Church in Rome; it has 100 stops; that of the Seville Cathedral has also 100 stops and 5,300 pipes; one at Weingarten, in Swabia, 60 stops and 6,666 pipes; one at Haarlem, 60 stops and 5,000 pipes. The organs of Notre Dame and Saint Sulpice, in France, are likewise very large. The largest organ in England is that built in 1870 for the Royal Albert Hall, London. There are five rows of keys for the choir, great, swell, solo, and pedal organs; 138 stops, and nearly 10,000 pipes. The largest organ in existence is in Sydney, New South Wales.

There was but slight interest taken in organ construction in the United States until about the middle of the 19th century. The erection of the great organ in the Music Hall, Boston, by a German builder, Walcker of Würtemberg, gave the first impetus to public interest in the matter. Roosevelt of New York, and Jardine, likewise of New York, soon became two of the best-known organ-builders in America. Roosevelt invented "the automatic adjustable combination," which enables the player to place any required combination of stops under immediate control, and to alter such combinations as frequently as desired. By his construction of the wind-chest, also, each pipe has its own valve, actuated by compressed air. Among the largest organs in America are the organs of the Roman Catholic Cathedral, Montreal, the cathedral of the Holy Cross, Boston, which possesses 83 stops; the Music Hall, Cincinnati, with 96 stops and 4 manuals, and the Tremont Temple, Boston, with 65 stops. Consult: Dixon, 'Practical Organ Building' (1881); Hinton, 'Organ Construction' (1900).

Organ Mountains, or **Serra dos Orgãos,** Brazil. See ORGÃOS, SERRO DOS.

Organ-Point, or **Pedal-Point,** a musical term derived from the mediæval *organicus punctus,* and applied to the single tone, usually the tonic or dominant, held or maintained by one of the voice parts, while the other parts move freely, without reference to the sustained tone, except at the beginning and the end of the passage. In modern composition the organ-point is usually in the bass, hence the alternative term pedal-point, the organ pedal being best adapted to sustain the long note. When an organ-point occurs in any other part than the bass, it is said to be inverted, and if in the soprano is called the "holding-note," this term being also of mediæval conception and the origin of tenor from *tenere,* to hold, the voice by which the *organicus punctus* was generally sustained to an effective contrapuntal climax. In many modern compositions, especially pastorales, a double-organ or pedal-point on both tonic and dominant is frequently used.

Organic Chemistry, the chemistry of the carbon compounds in which the hydrogen or nitrogen of the substance is directly united with carbon. See CARBON COMPOUNDS.

Organo-Metallic Compounds, in chemistry, compounds consisting of an organic radical in combination with a metallic base. The alkyl radicals — methyl, CH_3; ethyl, C_2H_5; propyl,

C_7H_7; etc.— are the most familiar examples of organic bases which enter into combinations of this character; and zinc, lead, tin, and mercury are the most important metallic elements which combine with them. Zinc-ethyl, $Zn(C_2H_5)_2$, may be prepared by the action of metallic zinc upon ethyl iodide, C_2H_5I. A non-volatile, crystalline compound having the formula C_2H_5ZnI is formed at first, but under the influence of heat this decomposes into iodide of zinc and zinc-ethyl. As thus prepared, zinc-ethyl is a colorless liquid, which boils at 244° F. When exposed to the air it takes fire spontaneously, burning with a greenish flame. It may be converted, by slow oxidization, into ethylate of zinc, $Zn(OC_2H_5)_2$. Three compounds of ethyl and tin are known, and two compounds of ethyl and lead. Boron and silicon form compounds with ethyl, and these, although they contain no metal, are also called "organometallic" bodies. Silicon-ethyl has the formula $(C_2H_5)_4Si$, and may be prepared by treating zinc-ethyl with silicon tetrachloride. It is a colorless liquid, boiling at 302° F. Several of its derivatives have a considerable theoretic interest, among these being a substance which has the formula $SiC_8H_{20}O$, smells like camphor, and behaves, chemically, like an alcohol. Sodium-ethyl has not been isolated in the pure state, but a double compound of this substance and of zinc ethyl has been prepared, having the formula $NaC_2H_5 + Zn(C_2H_5)_2$.

Organotherapy, the medical use of animal organs or glands, or of their extracts. The use of the extracts of many of the viscera of lower animals for their remedial effects in illness is of great antiquity. The savage who ate the heart of his courageous enemy had an inkling of a truth, even if the results were obtained only by suggestion. Ancient Chinese, Indian, Greek, and Roman medicine dealt largely with the fancied effects of eating certain organs, but it has only been within the era of exact physiological chemical methods that physicians have been in a position to apply the principles of organotherapy along rational and individual lines. As Paracelsus was the first to show that it was not the entire drug that was valuable, but that each drug contained some active principle to the action of which its effects were due, and thus was the forerunner of the distinctly modern school of "active principles," so Brown-Séquard, who maintained (1869) that each organ of the body had an internal secretion which was an active agent, was the founder of the modern school of organotherapy. The full applications of these general truths are far from being in sight, especially when one considers the recent developments of knowledge concerning specific cytotoxins, cytolysins, etc. Claude Bernard may be said to have antedated Brown-Séquard when he discovered the glycogenic function of the liver; but Brown-Séquard, with more brilliancy and fancy than fact, made the broad application that all the glands of the body — liver, spleen, suprarenals, kidneys, testes, thyroids, ovaries, etc.— possessed internal secretions which passed into the blood and lymph and thus contributed to the metabolism of the body. Subsequent study has not borne out his theory, but it is known that certain glands and organs of the body do contain substances which are found only in those particular glands and organs, and which, extracted from the corresponding glands in the lamb, sheep, pig, cow, etc., and used hypodermatically, or by the mouth, have marked physiological actions and may be employed in therapeutics. Many of the extracts first devised by Brown-Séquard are now known to be worthless, particularly the extracts from the testicles of the ox and ram, which were to invigorate the old, and extracts of the brain, of the ovaries, and of the mammary glands. All of these contain well-known compounds which are present in most of the tissues of the body, and beyond possessing certain tonic properties, such as a good beef-tea would possess, their action is nil. Later study has shown, however, which of the organs contain practicable therapeutic principles, and further research will undoubtedly reveal others, and may discover some in the organs now rejected as containing nothing specific. The most important of these substances now used in medicine are derived from the liver, the stomach, pancreas, thyroids, thymus, suprarenals, and sexual organs of the more common domestic animals. Of these the digestive ferments pepsin and pancreatin, iodothyrin from the thyroid, epinephrin from the suprarenals, and spermin from the testicles are the most important. The action of the digestive ferments is discussed under digestion (q.v.).

The peculiar symptoms that resulted from the taking out of the thyroid gland in men and animals drew attention to this organ and its effects on secretion. The close resemblances of certain diseased persons to man and animals deprived of this gland was noted, and it was soon established that myxœdema and cretinism (q.v.), two hitherto intractable diseases, were really due to diseases of the thyroid function. It was but a step, after finding the cause, to apply the remedy, thyroid extract, and these two previously hopelessly incurable diseases became amenable to treatment. At first fresh glands were used; later, extracts; still later, the active principle, called by a variety of names iodothyrin, thyoiodin, thyreoglobulin, etc. Thyroid extract causes, in addition to its effects in metabolism, a fall of blood-pressure through dilatation of the blood-vessels, and a slight depressing action on the heart in large doses. It also increases the nervous irritability of the heart-muscle by reason of its action on the vagus nerve. Small doses of the drug administered during a considerable period of time cause symptoms comparable to exophthalmic goitre (q.v.). The diseases for which it is used are: Cachexia strumipriva, following surgical removal of the thyroids; goitre of the hyperplastic follicular variety, a form which is associated with diminished formation of thyroid substance; myxœdema, sporadic cretinism; certain obscure skin-diseases, and obesity. It is also used as a general metabolic stimulant. Within a few years an extremely active and powerful substance has been discovered in the suprarenal glands. It has received various names, myxœdema, suprarenin, adrenalin, etc., all of which are closely allied products that represent as nearly as possible the active principle or principles of this gland. This substance in the human body is probably of great importance in maintaining the tension of the blood-vessels, and it also bears some relation to the sugar-oxidizing properties of the liver or pancreas, or both. The effects of adrenalin, used hypodermatically, are immediate. It causes

a marked rise in the blood-pressure, due to its stimulating the mechanism that constricts the blood-vessels; it slows the heart and causes it to beat more strongly; it depresses the breathing centres somewhat, dilates the pupils, and slows down the peristaltic movements of the intestine. In medicine it is extremely useful as a local application to constrict blood-vessels, lessening hemorrhage, reducing inflammation, stopping discharges of the mucous membranes. It is thus particularly valuable in sore throat, running from the nose, inflammation of the eye, hemorrhage from the nose, or from the stomach. It has a certain value in some forms of diabetes, especially in bronzed diabetes, in rachitis, in spasmodic asthma, and in the treatment of shock of any description, particularly if associated with loss of blood-pressure. The use of the active principle of the suprarenals is only just begun.

In the sexual glands substances rich in nucleins and phosphorus are present. Many of these have received names, but few have been isolated in sufficiently pure form to be useful in therapeutics. Those that are now (1904) available stimulate metabolism, and some are of value for counteracting the undesirable effects of the removal of some one of the organs of generation, as in castration or in ovariotomy.

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Editor 'Journal of Nervous and Mental Disease.'

Or'ganzine. See SILK.

Orgãos, Serra dos, sär'rā dōsh ôr-gownsh', or **Organ Mountains,** Brazil, a portion of the Serra do Mar cordillera, 40 miles northeast of the city of Rio de Janeiro, so called from their resemblance to the pipes of a church organ, as viewed from the sea. The highest peak is 3,800 feet.

Orgaz, ōr'gäs, **Francisco,** Cuban poet: b. Havana, Cuba, 1815; d. Madrid, Spain, 1873. He was educated in Havana, entered journalism and in 1839 went to Madrid where he took up his residence. His first volume of poetry, 'Preludios del Arpa' (1841), won for him recognition as one of the best lyrical poets of Spanish-America; he also wrote two dramas and several historical works besides a second volume of verse 'Las Tropicales' (1850).

Orgeat, a flavoring substance much used in medicinal and other drinks. It is essentially a syrup of sweet and bitter almonds, and possesses a rich almond flavor, but it is often modified by the use of other ingredients

Orgetorix, ôr-jĕt'ō-rĭks, Helvetian chief: d. about 62 B.C. He was a man of vast wealth and power and intrigued to gain sovereign power, endeavoring to persuade the Helvetii to emigrate to Gaul. His designs were suspected and he was brought to trial, but died, supposedly by his own hand, before a decision was rendered. Consult Cæsar's 'Commentaries,' book I.

Orghyeeff, Russia, district town in the province of Bessarabia. It is situated about 30 miles north of Kishineff railway station. The ruins of an old Dacian fortress, Petrodava or Orhei, are near the town. It was annexed to Russia in 1812. Pop. 13,356.

Orgies, ôr'jĭs, or **Orgia.** See BACCHUS.

Orguineth, ôr-gī-nĕt. See MUSICAL INSTRUMENTS, MECHANICAL.

Oria, Italy, a town in the province of Lecce, and the district of Brindisi, on the Brindisi-Taranto Railway, 22 miles west-southwest of Brindisi. The town is built on a hill between two small lakes; it is the see of a bishop and has a cathedral, a mediæval townhouse, a library, hospital, and gymnasium. It carries on a trade in wine and oil. Oria was the ancient Greek settlement Uria or Hyria. Pop. 7,100.

Oriana (1). The mistress of Amadis de Gaul, the legendary hero of mediæval chivalry. According to romance she was the daughter of Lisuarte, the English monarch. Queen Elizabeth was often styled "The peerless Oriana" in the complimentary poems of her day. (2) The chief personage in Fletcher's comedy, 'The Wild Goose Chase' (1621), and in Farquhar's comedy 'The Inconstant' (1702). (3) A character in Beaumont and Fletcher's play, 'The Woman Hater' (1607). (4) The title of a poem by Tennyson in which the name is introduced as a constant refrain (1830).

Oriana, The Triumphs of, the title of a book of madrigals composed in honor of Queen Elizabeth, which Thomas Morley compiled and printed in 1601.

Oriani, ō-rē-ä'nē, **Barnaba,** Italian astronomer: b. Garegnano, Italy, 1752; d. 1832. He studied astronomy under Lagrange, assisted Reggio and De Cesaris in measuring the arc of the meridian and his calculations proved Ceres, which Piazzi discovered in 1801, to be a planet, not a comet as Piazzi had supposed. He was director assistant in Brera Observatory at Milan in 1802, and was editor of the 'Effemerid Astronomiche' in 1778–1830. He was created a count by Napoleon and published: 'Tables of Uranus' (1785); 'Spherical Trigonometry' (1806); etc.

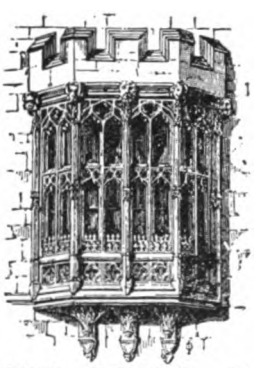
Oribasius, ôr-ĭ-bā'shĭ-ŭs, Greek physician to the emperor Julian: b. Pergamon (or Sardis) about 325 A.D.; d. about 400. He studied in Cyprus under Zeno, became attached to Julian during the Oriental exile of the latter, accompanied him to Gaul, and, after his accession in 361, was appointed quæstor of Constantinople. But after Julian's death, when the Christians again obtained the upper hand, he was banished among the Danubian barbarians. He was recalled during his last years. Oribasius is reputed the discoverer of the salivary glands. Under Julian's direction he summarized the medical lore of the day. A Latin version of the 6th century has been edited by Bussemaker, Daremberg, and Molinier.

Oribe, ō-rē'bā, **Manuel,** Uruguayan soldier and politician: b. Montevideo, Uruguay, about 1802; d. there November 1857. When but a boy he entered the patriot army, where through his ability he won high rank; he was minister of war under José F. Rivera in 1833–5, succeeding him in the presidency in the latter year. Rivera raised a revolt against him in 1837 and finally succeeded in defeating and forcing him to leave the country. Oribe gained

the support of the dictator Rosas, at Buenos Ayres, and in 1842 began the Nine Years' war, intending a foreign subjugation of Uruguay. The intervention of France and Brazil prevented the success of his scheme, and his plan to seize the presidency in 1855 was rendered futile by the foreign powers.

O'riel College, Oxford, England, founded in 1326 by Edward II. on the suggestion of Adam de Brome, his almoner, for a provost and ten fellows, and first named the College of Saint Mary, its present title being probably derived from La Oriole, the name of the house presented by Edward III., into which they moved two years later. The buildings of Oriel College are among the finest in Oxford. The college now consists of a provost, 12 fellows, and has 10 scholarships, tenable for 5 years, and 4 exhibitions tenable till the end of the twentieth term from matriculation. The value of each of these scholarships and exhibitions (during residence) is £80 per annum. Candidates for these exhibitions must be deserving persons in need of support at the university. No one is eligible to a scholarship who has attained the age of 20 years, or who, being a member of the university, has exceeded two years from his matriculation. The college has presentations to 15 livings. Among its distinguished alumni are Matthew Arnold, Barclay, Butler, Clough, Hampden, Thomas Hughes, Langland, Prynne, Sir Walter Raleigh, Cecil Rhodes, Wilberforce, etc., and several leaders of the Tractarian movement, Arnold, Keble, Newman, Pusey, and Whately.

Oriel Window, a bay window of an upper story supported by brackets or corbels. In some cases the support is derived from a pier or engaged column carried from the ground



Oriel Window, Balliol College, Oxford.

with the upper part corbeled out to meet the floor of the projecting window. Formerly no distinction was made between this and a bay window which rose from the ground.

Orient, Joseph, Austrian painter: b. Burbach, Westphalia, 1677; d. Vienna 1737. He studied painting under Faistenberger, and was appointed vice-director of the imperial collection of pictures at Vienna. He painted a large number of landscapes, which were much appreciated in his time, partly on account of a really effective rendering of nature, and partly on account of an unusually brilliant and refined coloring. Several of his pictures were engraved by Leichsenring and Rosel and became very popular.

Orien'tal Region, one of the primary divisions of the earth considered with reference to its fauna; a zoogeographical province. It embraces the whole of southeastern Asia south of the Himalayan watershed, from Beluchistan to the Philippines and including all the Malayan archipelago as far as Celebes. It is separated from the Australian region by «Wallace's Line.» See ZOOGEOGRAPHY.

Oriental Research, the investigation and interpretation of literary remains in the East.

Egypt.— Modern Oriental research commences with the expedition of Napoleon Bonaparte to Egypt in the summer of 1798. This expedition was accompanied by scientists and artists, who published the results of their observations in a great work entitled 'Description de l'Egypte' (1809–13). The antiquities collected by that expedition became the property of the conquering British and formed the foundation of the Egyptian collections in the British Museum. Among these was the famous Rosetta stone. This was a slab of black granite containing a portion of a decree in honor of Ptolemy V. Epiphanes, 205–181 B.C., written in the ancient Egyptian hieroglyphics, the more modern Egyptian demotic script and in Greek. By means of this trilingual inscription the hieroglyphic characters were deciphered by Young in England and Champollion in France, almost at the same time — 1821–2, and finally, at a later date, the demotic script was also deciphered. This inscription, therefore, became the key to the interpretation of all Egyptian literature and civilization. The decipherment of the Rosetta stone led to a desire to obtain more inscriptions, and in 1828 a Franco-Italian expedition was sent out, headed by Champollion and Rosellini, to examine the most important ruins of Egypt and copy pictures and inscriptions. The published results of this expedition remain to this day a store-house of material for Egyptologists. In 1840 the Prussian government sent out a similar expedition under Lepsius. Taking advantage of the work already done, Lepsius was able to arrange the monuments discovered in historical order, and to place the study of Egyptian art and civilization on a permanent and scientific basis. This expedition was particularly interested in the question of the relation of Egypt to Bible story, so that in addition to the exploration of Egypt and Ethiopia, the peninsula of Sinai was visited, its ancient copper mines and Egyptian inscriptions dating back to the time of the old empire discovered, and an effort made to trace the route of the Exodus.

The period of extensive excavations commenced in 1850, with the mission of a French scholar, Augustus Mariette. The first and greatest of his discoveries was the Serapeum, or tombs of the sacred Apis bulls at Memphis, 64 in all. The erection of these tombs extended through the period from 1300 to 50 B.C. Here were found also thousands of memorial stones erected by pious pilgrims, amulets, funeral figures and so forth. In 1857 the Khedive established a museum at Cairo, appointed Mariette director, and gave him authority to conduct excavations where he would in Egyptian terri-

tory. From this time until his death, in 1880, Mariette exercised the exclusive privilege of excavation in Egypt. His explorations were enormous in extent, including all the well known ruins, and more of the great discoveries of Egyptology were made by him than by any other one man. No systematic report of his excavations as such has ever been published. He was concerned principally in the discovery and recovery of antiquities, a method of excavation which inevitably results in the destruction of a great amount of material archæologically valuable, and his publications concern themselves with the antiquities discovered, not with the method of their discovery. Since his death the direction of antiquities in Egypt has remained in the hands of the French. A careful system of protection and preservation of antiquities and ruins has been introduced, a large new museum constructed (1902), and excavations systematically conducted at numerous sites on behalf of the Egyptian museum.

Reversing the policy of Mariette, permission was given by his successor, G. Maspero (now serving a second time as director of antiquities), to representatives of other nations and to private persons to conduct excavations under reasonable restrictions and to acquire and export antiquities. Taking advantage of this change of policy, the Egypt Exploration Fund was organized in 1883, and has been supported from that day to the present day by funds collected in almost equal parts in England and America, although the direction has been entirely in the hands of the English contributors. The first work of this Fund was done in the Delta, in the excavation of the biblical store-city of Pithom and the Greek city of Naukratis. Since 1891 these excavations have been conducted in upper Egypt. The most famous name connected with the excavations of the Egypt Exploration Fund is that of W. Flinders Petrie. Working at times for the Fund (regularly since 1896) and at times on account of private persons, Petrie has achieved astonishing results, and claims to have carried back Egyptian history to an almost incredibly early period. Certainly he has proved that Menes, the supposed mythical founder of the first Egyptian dynasty, was a real person, by discovering inscriptions of his reign, and he and others have found remains of a civilization long antedating even this period of Menes. To give young Egyptologists a chance to excavate on their own account, Petrie organized in 1896 the Egyptian Research Account.

The last decade has been one of especial activity in Egyptian exploration, and, even in comparison with the great discoveries of Mariette's time, fertile in results. In those years independent expeditions have been conducted by Swiss, Germans and Americans, among whom may be mentioned Mrs. Hearst; while since 1899 the German "Orient Gesellschaft," organized somewhat after the method of the Egyptian Exploration Fund, but covering a larger field, namely, the whole Orient, has conducted systematic excavations at various points.

The objects found in excavations in Egypt are almost incredibly numerous. Besides the magnificent collections in the museum at Cairo, there are important collections of Egyptian antiquities in the British Museum, the Louvre, the Berlin Museum, Turin (here is the famous Papyrus Prisse), and smaller collections in various museums in the United States and elsewhere. Besides the monuments and papyri belonging to those periods which we commonly call Egyptian, written in Egyptian characters, there have been found, especially in the last decade, mainly in the Fayum, large numbers of papyrus fragments, containing parts of Greek manuscripts, some like Aristotle's 'Constitution of Athens' and the poems of Bachyllides; others, like the Logia of Jesus, various heretical gospels, apocalypses and the like, of theological value. Great quantities of letters, deeds and documents of various descriptions, written on fragments of papyrus, potsherds and the like, have also revealed with photographic minuteness the every-day life of the people of the Fayum district in the centuries immediately preceding our era. Of late also renewed attention has been paid by explorers to the Christian (Coptic) and Moslem remains with which Egypt abounds, but which earlier generations of explorers and scholars had overlooked.

Assyria and Babylonia.— Assyrio-Babylonian research may be said to begin with the tentative excavations of Rich at Babylon in 1811. Others before that date had identified the ruin mounds of Babylon and Nineveh, and copies of Babylonian and Persian cuneiform inscriptions had already made their way to Europe, but Rich made the first serious survey of the mounds of Babylon. In 1820 he made a similar exploration in the ruined mounds of Nineveh and Calah. The inscriptions secured by him at these sites formed a nucleus for the later great Assyrian and Babylonian collections in the British Museum.

More than 20 years elapsed after Rich's death before any systematic excavations were undertaken. Then through the influence partly of Julius Mohl, one of the secretaries of the Société Asiatique, who had seen in London the inscribed material gathered by Rich in Assyria and Babylonia, the French government was induced to create, for purposes of investigation, a vice-consulate at Mosul, nearly opposite Nineveh, and Paul Emil Botta was sent out to fill this position. After some rather unsuccessful excavations at Kuyunjik, on the site of ancient Nineveh, Botta was led by the reports of the natives to undertake excavations at Khorsabad, 20 miles to the northeast. Excavations were conducted at this site by Botta from March of 1843 to October of 1844, and by his successor, Victor Place, from 1851 to 1855, at the expense of the French government, which also published the results in monumental form. These results were the systematic and scientific excavation of a palace of Sargon, king of Assyria, 721–705 B.C., which was adorned with a large number of magnificent bas-reliefs and other works of art. The French expedition also discovered a considerable number of inscriptions in the cuneiform script on stone and clay.

Shortly after Botta commenced his work of excavation, Austen Henry Layard visited Mosul on his return from Persia to Constantinople. His enthusiastic report secured for him a small sum of money from Lord Stratford de Redcliffe, the British ambassador, with which he returned to Mosul in the autumn of 1845 and commenced excavations on a very small scale at the mounds

of Nimroud, on the banks of the Tigris, a few miles below Mosul, the remains of the one time Assyrian capital city of Calah. With very limited resources but with remarkable success in the discovery of sculptures, bas-reliefs, inscriptions and the like, Layard continued to excavate at Nimroud, Kalah Shergat, the most ancient capital of Assyria, still further to the southward, and at Kuyunjik (Nineveh), until midsummer 1847. In 1849 he was again sent out to Assyria and for almost three years conducted excavations for the British Museum at the sites already mentioned, making one brief and unsatisfactory expedition to Babylonia. The wonderful success which Layard achieved in monymental results, and possibly still more the remarkable ability with which he presented these results in graphic form, connecting them also with the Bible story, aroused an interest which has continued to the present day, and which will forever make the name of Layard illustrious in connection with Assyrian exploration.

In 1851, while Place was excavating at Khorsabad, an admirably equipped expedition, sent out by the French government under the direction of M. Fulgence Fresnel, was exploring Babylonia and conducting tentative excavations at various sites in that region. The material results of this expedition were, unfortunately, lost by the over-turning of a raft on the River Tigris. At the same time the attention of the English was called to Babylonia by the work of Loftus, who, sent out as an attaché of the Turco-Persian Frontier Commission, took occasion to explore Babylonia and conduct some small excavations at Warka (Erech). The Assyrian Excavation Fund was organized in 1852, and under the general direction of Sir Henry Rawlinson, excavations were carried on by Loftus, Taylor and Rawlinson himself at various sites in Babylonia, including Erech, Ur, Eridu, Larsa and Borsippa, the sister city of Babylon, and by Hormuzd Rassam at Nineveh. None of these explorers undertook the scientific excavation of sites, but rather sought to recover inscribed material, which, in the form of clay tablets and cylinders, they found in large quantities, especially Rassam, who, without knowing it, excavated a large part of the library of the Assyrian king, Ashurbanipal (668–626).

From 1855 to 1872 there was a long period of inactivity, so far as excavations were concerned, the attention of scholars being directed to the study of the numerous inscriptions which had been brought back to England and France, the key to the decipherment of which had just been discovered. As in the case of the Egyptian inscriptions, so here, it was a trilingual inscription which furnished the clue to the decipherment. As early as the commencement of the 19th century various scholars had essayed to read the cuneiform inscriptions brought back from Persepolis and elsewhere, and different scholars succeeded at various times in deciphering a few characters, but not in reading an inscription. On the face of a cliff, in a huge space especially prepared for the purpose, its lowest part some 300 feet above the ground, in the mountain pass at Behistun in Persia, Darius, so tradition said, had caused a long inscription to be engraved. Of this inscription Sir Henry Rawlinson on various occasions, between the years 1835 and 1839, at considerable expense and much risk of life and limb, succeeded in obtaining complete copies. In what languages the inscription was written was unknown, but Rawlinson assumed that the first column was Persian, similar to the language of the Avesta. It was not until 1846 that he was able to complete and publish the decipherment of this first column, the Persian cuneiform text. The Persian cuneiform proved to be syllabic, an adaptation vastly simplified from the complex Semitic Babylonian of the third column. This third column, the most important text for students of Assyriology, Rawlinson did not succeed in deciphering for five more weary years (1851). The second column, the Median or Susian text, was not satisfactorily deciphered until 1890. The decipherment of these inscriptions was naturally an epoch-making event, and for this as well as for the great service which he rendered in publication (he was the general editor of the Cuneiform Inscriptions of Western Asia, published by the British Museum), Rawlinson's name stands deservedly at the head of the honor list of Assyriology.

In 1872 George Smith, then an employee in the British Museum, discovered among the fragments of clay tablets brought by Rassam from Nineveh, an Assyrio-Babylonian flood legend, strikingly similar in many respects to the flood story of the Hebrew scriptures. The publication of this story aroused such interest that the *Daily Telegraph* of London at once put at the disposal of the British Museum a thousand guineas to send Smith to Kuyunjik to search for more fragments. This expedition opened a new era of excavation. In the following year Smith was again sent to Kuyunjik by the British Museum. In 1875 he was sent out for the third time, but died, without accomplishing anything, in 1876. He was a most acute student of the cuneiform texts, but no explorer. Rassam then consented to take up once more the work of excavation for the British Museum. Besides excavating at Nineveh and Calah, he explored in this campaign (1877–82) the hitherto unknown Assyrian site of Balawat, where he found the great bronze doors with the inscriptions and reliefs of Shalmaneser II., 859–826 B.C. He also conducted excavations at a number of Babylonian sites, Borsippa, Cutha, Sippara and others, from which he secured an almost incredible number of inscribed clay tablets. His work was conducted, like that of English explorers in general, for the purpose of obtaining inscriptions, with no attempt at a complete and scientific excavation of the sites explored.

At the same time that Rassam resumed his work of excavation, DeSarzec was appointed French consul at Bassorah in southern Babylonia. Led by reports of the natives, he commenced excavations at some ruin mounds in that region, known as Telloh, where he found a quantity of statues dating from the third millennium B.C., executed with remarkable skill in hard diorite and covered for the most part by inscriptions in cuneiform characters, the first monuments of art discovered on the soil of Babylonia. These monuments were purchased at once by the French government for the Louvre Museum, and DeSarzec commenced a systematic exploration of Telloh (Sirpurla), which was conducted at intervals until the time

of his death, in 1903. The result of these excavations was the discovery of an enormous quantity of inscribed clay tablets belonging to a most remote period, as well as statues, inscribed bronze and silver figures, vases and other objects, showing a remarkable development of art in that region at an extremely early period.

American interest in Babylonian exploration dates from the year 1884, when an expedition headed by Dr. William Hayes Ward, called the Wolfe Expedition, from the fact that the funds were provided by the liberality of Miss Catherine Lorillard Wolfe, of New York, was sent out under the auspices of the Archæological Institute of America, to examine ruin sites in ancient Babylonia and report on the prospects, scientific and practical, of excavations in that region. In 1887 a somewhat similar German expedition was sent out, which conducted tentative excavations in two burial mounds, Hibba and Surghul, in southern Babylonia. Both of these expeditions reported favorably on Nuffar, the site of the ancient Nippur, as a place for excavation. In 1888 the Babylonian Exploration Fund was organized in Philadelphia and an expedition was sent out under the auspices of the University of Pennsylvania, with the present writer as director. The site selected for excavation was Nippur. The systematic exploration of this site has been continued, with intermissions down to the present time, under Peters, Haynes and Hilprecht, the last period of actual excavation ceasing in 1900. The main work of the excavation at Nippur has been directed toward the great Temple of Bel, the chief religious centre of that region from a period long antedating 4000 B.C. Some 40,000 or more inscriptions, clay tablets and fragments of clay tablets, stone monuments and the like have thus been recovered, and our knowledge of the history and civilization of Babylonia carried back 2,000 years or more.

The success of the Americans in securing remains of such great antiquity aroused new interest both in England and Germany. In 1897 a new expedition of investigation was sent out by the Germans, and in 1899 the German «Orient Gesellschaft» was organized, and excavations commenced at Babylon under the direction of Dr. Koldewey. From that time until the present the work of systematic excavation has continued at that site, while supplemental excavations have been undertaken at various ruin mounds in Babylonia and Assyria. The interest aroused in America led to the organization in 1900 of the Ur Expedition, through the energy and enthusiasm of Dr. E. J. Banks, and permission was applied for to excavate at Mugheir, the ancient Ur of the Chaldees. For three years this permission was held up by the Turkish government, although during that period similar permission to excavate at various Babylonian sites was freely granted to the Germans. At last in 1903 the Ur Expedition was disbanded. Just at that moment the despatch of American ships to Beirut led unexpectedly to the issuance of the firman which had been so long delayed. Simultaneously a new organization was formed, called the «Oriental Exploration Fund of the University of Chicago,» which accepted the firman issued on behalf of the Ur Expedition, and in the autumn of 1903 excavations were commenced by the new American expedition at Bismaya, the site of an ancient Babylonian city, supposed to be Isin, not far from the ancient Nippur, under the direction of Dr. Edgar J. Banks. In that same year also the English resumed the work of excavation at Nineveh, so that at the present writing four nations are concerned in the excavations in Babylonia and Assyria. The principal collections of Babylonian-Assyrian antiquities are to be found at London, Paris, Constantinople, Philadelphia and Berlin.

Persia.— Research in Persia is closely connected with research in Babylonia, and it was through the decipherment of the cuneiform inscriptions found in Persia that the key to the decipherment of the Babylonian inscriptions was discovered. Rich visited and described Persepolis as well as Babylon and Nineveh, and other early explorers copied inscriptions there and elsewhere in Persia; but no excavations were conducted until 1851. These first excavations, conducted by the English explorer, Loftus, and Col. Williams, head of the Turco-Persian Frontier Commission, were, however, of very small extent. Thirty years later M. and Mme. Dieulefoy conducted excavations of a more extensive character at the same place, enriching the Louvre museum in Paris with very many beautiful colored tiles, and published an account of their discoveries in their 'L'Acropole de Susa' (1890); but even these excavations were very superficial.

In 1895 the French government concluded a treaty with Persia, by which it received exclusive rights of excavation, and in 1897 M. J. de Morgan, at that time director of antiquities in Egypt, was appointed director of excavations in Persia. Since that date systematic and expensive excavations have been conducted at Susa by M. de Morgan and his associates for the French government, and the results have been published with remarkable promptitude and in admirable form for the student. The explorers have been remarkably successful in discovering a large amount of inscribed material showing that the early civilization of Elam in the third millennium B.C. was practically identical with that of Babylonia, from which it was derived. The most important discovery made in the excavations up to this time, and one of the most important in the annals of Oriental research, was the discovery in the winter of 1901–2 of a large stele, carried off by the Elamites from Babylonia, containing the code of laws of Hammurabi, king of Babylon, about 2250 B.C., the earliest code of laws by much more than 1,000 years, discovered anywhere up to this time, and one which profoundly influenced the legislation and civilization of all western Asia.

Palestine.— While the keenest interest in Egyptian and Babylonian excavations was aroused by their relation to the Bible, exploration in Palestine, the Bible land proper, commenced at a much later date and has been prosecuted with less energy than the similar work in those regions. The first important work was done by an American, Rev. Dr. Edward Robinson of New York. In 1838 (and again in 1852), accompanied by Eli Smith, an American missionary in Beirut, he explored the Holy Land, identifying for the first time on

rational grounds the greater part of the ancient sites of the country, a work of historical topography. The second move in the exploration was also made by America, the United States government sending out an expedition in 1847 under Lieutenant Lynch of the Navy, to explore the Jordan and the Dead Sea.

It was not, however, until 1865 that an organized effort was made to undertake a scientific and complete examination of the country. In that year the Palestine Exploration Fund was organized in England, and undertook to explore and map Palestine west of the Jordan, and shortly after a similar organization was formed in America to explore Palestine east of the Jordan. The American society accomplished very little and soon passed out of existence. The English society, which continues in existence to the present time, conducted a thorough survey of the west Jordan territory and made an accurate map of the country, and has published a monumental series of memoirs dealing with the climate, the fauna, the flora, the antiquities, etc., of the territory surveyed, and latterly also the excavations accomplished.

Excavations were conducted by the Fund at Jerusalem, from 1867 to 1870, under the direction of Sir Charles Warren, which were valuable in determining the topography of the temple area, although almost nothing was found in the way of antiquities For the next 20 years no further excavations of importance were conducted. The Fund confined its explorations to the survey and to antiquities on the surface of the ground, every foot of which was minutely explored. The survey of western Palestine was completed in 1878, and in 1881 a similar work was undertaken in Palestine, east of the Jordan; but after about 500 square miles in Moab had been surveyed, the Turkish authorities put a stop to this work. In 1878 a German Palestine society was organized on the same plan and with the same objects as the English Exploration Fund. In the employ of this society Dr. Schumacher, of Haifa, an American citizen, has, since 1884, surveyed and mapped the greater part of the east Jordan region; and it may now be said that, so far as the surface is concerned, Palestine has been more thoroughly explored than any Oriental country. So far, however, it has proved singularly lacking in important monuments and inscriptions, and such as have been found have been found by the natives or by accident. These are first the inscription of Mesha, a king of Moab in the 9th century B.C., found by a German missionary, Klein, at Dibon, in 1868, and later largely destroyed by the Arabs; secondly, a Hebrew inscription, possibly of the time of King Hezekiah, found in the Siloam tunnel, beneath the hill of Ophel, and dealing with the construction of that tunnel; and thirdly, a Greek barrier inscription from the temple of Herod, found by Clermont Ganneau in use as a tombstone in an old graveyard in Jerusalem. More important for the history of Palestine, however, than any of these inscriptions found in Palestine itself, was the discovery in 1887 by natives, at Tel el-Amarna in Egypt, of about 300 clay tablets written in the Babylonian cuneiform script, from kings, petty princes and Egyptian representatives in Palestine, northern Syria, Mesopotamia and Babylonia to the Egyptian over-lord, about 1400 B.C. The discovery of these inscriptions made it plain that at that date, antedating the Hebrew conquest, Palestine possessed a civilization largely identical with that of Babylonia, and that writing on clay tablets was practised in that region.

This discovery led to the belief that excavations in Palestinian sites would result in the discovery there of similar inscriptions on clay, and probably also of stone inscriptions like the Mesha monument and the Siloam inscription from the Hebrew period. On behalf of the Palestine Exploration Fund, Petrie, the Egyptian explorer, made a reconnoissance in 1889, and conducted tentative excavations at the mound of Tel el-Hesy, the ancient Lachish, in the extreme southwestern part of Judæa, on the borders of the Philistine plain. In the following year the Palestine Exploration Fund entered upon a systematic campaign of excavation under the direction of Dr. F. J. Bliss of Beirut, an American. Excavations were conducted at Lachish, 1890–3, at Jerusalem, 1894–7, where the southern wall of the city was excavated and traced, and from 1898 to 1900 at various sites in the Shephelah, the foot-hills between Judæa and Philistia, including Tel es-Safi, the ancient Gath, and Tel Sandahannah, the ancient Marissa. At the last named place a Seleucidan city was thoroughly explored. Later, the natives unearthed the necropolis of this city, and in 1902, Dr. Thiersch of Munich and the present writer had the good fortune to discover, in that necropolis, elaborately decorated tombs containing Greek inscriptions, belonging to a Sidonian colony settled at Marissa in the Seleucidan period, the only discovery of this sort yet made on Palestinian soil. In 1902, under the direction of Mr. R. A. S. Macalister, formerly Dr. Bliss' lieutenant, excavations were commenced at the site of the ancient Gezer, which are still in progress. The results of the excavations up to date have been, on the whole, disappointing. They have given us a general insight into the history of the civilization of the country from the prehistoric period onward, but almost no inscribed material has been found and very little which bears directly upon Biblical story. At Gezer the excavators have unearthed a pre-Israelitic, open-air temple or place of worship, consisting of huge stones set up in alignment. At Lachish one inscribed clay tablet was found of the same period as those from Tel el-Amarna; and at Ta'anach, on the plain of Megiddo, four more clay tablets of the same period were discovered by Dr. Sellin of Vienna in the course of excavations conducted by him in 1902.

Following the example of the Palestine Exploration Fund, in 1903 the German Palestine Society, in conjunction with the Orient Gesellschaft also commenced a campaign of excavation. The site selected for the first work, which is now in progress, was Muteselim and the neighboring Lejjun, presumably the site of the ancient Megiddo of the Canaanite and Hebrew, and Legio of the Roman periods, on the southern edge of the plain of Esdraelon.

In 1900, through the efforts of the late Prof. Thayer of Harvard, an American Oriental School, similar to the school of archæology at Rome and Athens, was established at Jerusalem, to give American students an opportunity for study and research in the Holy Land itself, and to secure continuous and systematic inves-

tigation, and in 1903 a similar German institution was also established at Jerusalem.

Outside of Palestine, excavations were conducted at various points on the Phœnician coast in 1860 and 1861 by a French expedition under the direction of Renan, without important results. In 1888 native stonecutters at Sidon discovered the so-called Alexander sarcophagi, which, with the sarcophagus of a Sidonian king, Tabnith, were excavated by Hamdy Bey and carried to Constantinople. These Sidon sarcophagi rank among the art treasures of the world. In 1901–2 a Phœnician temple was excavated at Sidon for the Turkish government by Macridi Bey. Through the interest in Oriental archæology aroused in the German emperor by his visit to the East, a German expedition was sent out in 1901 to explore and restore the ruins of the temples at Baalbek. At the same time the Sultan presented to the Kaiser the small but remarkable ruins at Mesheytta in Moab, and in 1903, under the direction of Dr. Schumacher, these were removed bodily to Berlin to adorn the New Friedrich Museum.

In northern Syria, which abounds in ruin sites, almost no excavations have been conducted as yet. Some very superficial work was done at Carchemish (Jerabis), the ancient Hittite capital on the Euphrates, by the English about 30 years ago, and in 1887 the Germans conducted systematic excavations at the small mound of Sinjirli, northward of Aleppo, which resulted in the discovery of Aramæan and Hittite inscriptions and sculptures, in the 8th and 9th centuries B.C.; but for practical purposes this region is still virgin to the excavator. The surface antiquities of northern Syria southward to the Hauran were explored, inscriptions collected and the like about 40 years ago by two French scholars, de Vogué and Waddington, and various scholars have visited and described the Palmyrene region. The latest and most complete work in the surface exploration of Syria is that done by the American Archæological Expedition to Syria in 1899–1900, under the direction of Howard Crosby Butler.

Asia Minor.— The only excavations so far conducted in Asia Minor have been those at points along the coast. The famous excavations of Schliemann at Hissarlik, the site of ancient Troy, gave us our first glimpse of the civilization of the Mycenæan period, and showed us the existence of long eras of city building preceding even the 15th century B.C. Excavations at Pergamos, Assos and Ephesus, with smaller excavations at Cyzicus, Halicarnassus, etc., conducted by English, Germans, Americans and Austrians, have revealed remains of the later Greek and Græco-Roman periods. No excavation has been as yet conducted in the interior, but various travelers have explored the country for inscriptions and surface antiquities. Besides Greek and Latin inscriptions of the Christian and classical period, there have been found, cut on the rocks, rude figures and hieroglyphic inscriptions, belonging to an earlier civilization, the so-called Hittite, dating back perhaps as early in some cases as the 13th or 14th century B.C. These remains have been discovered all over Asia Minor, from the Mediterranean on the east to Armenia on the west and from a point a little south of the Black Sea on the north, far into Syria on the south. The inscriptions have not yet been satisfactorily deciphered, and the language and affinity of the people who used them are not yet known, but from information derived from Babylonian and Egyptian sources we are able to fix the approximate date of the Hittites, to whom they seem to have belonged, from the 13th or 14th to the 8th century B.C. From the distribution of the inscriptions it would seem that the centre of this civilization in the time of its flower was Cappadocia or Cilicia. From Cappadocia there have also been brought, since 1887, a considerable number of clay tablets with cuneiform inscriptions, some of which are at Philadelphia but the larger part in Saint Petersburg. These show the influence of Babylonian civilization and culture in Asia Minor. Further eastward, through Armenia, inscriptions have been found in cuneiform characters, cut in the rock, partly in the Assyrian language and partly in the native language of the country, which have now been deciphered, giving evidence of the existence of powerful kingdoms in that region in the 10th and following centuries, rivals of the Assyrian power.

Arabia.— Up to the present time no work of excavation has been conducted in Arabia. Various travelers have explored and mapped the country, from the time of the Danish Niebuhr (1761–4) onward. These include Burckhardt (1814–16), Burton (1853, 1877–8), Palgrave (1862–3) and others. These earlier travelers explored the country, visited Mecca and studied Arabic life and habits, but did little in the way of collecting or copying inscriptions. This was done principally by Halévy (1870–1), Doughty (1876–8) and Glaser (1882–94) in the south and Euting and Huber (1883–4) in the north. These explorations were conducted under the greatest difficulties. Halévy traveled as a poor Jew, Doughty lived as a Bedouin, others professed Isalm to accomplish their purpose, some, like Huber, lost their lives at the hands of fanatical natives. The inscriptions collected by Euting in northern Arabia show us the Aramæans still inhabiting that region in the 6th century B.C. The inscriptions from southern Arabia reveal the existence there as early as 1000 B.C. of civilized peoples using alphabets derived from the so-called Phœnician alphabet. We are able to trace the successions and names of certain kings and peoples, and some light has been thrown on the ancient religion and religious practices of the Arabs. Beyond this research in Arabian antiquities has not proceeded up to the present time.

General Results.— The general results of oriental research in Egypt and western Asia, covering in all a period of somewhat more than a century, have enabled us to trace the history and development of civilization from about 7000 B.C. onward. At about that date, research has now shown, there existed independent centres of civilization in Egypt and Babylonia, and those countries were at that time occupied by city-building and civilized peoples. By 400 B.C. a conventionalized script had been developed out of picture writing, independently in each of these countries, and the civilization of each region had assumed those definite types which we know respectively as Egyptian and Babylonian. From this point on we have in both cases written records, but no well determined system of chronology until a much later date. The civilization of Egypt, while attaining in the matter

of art, architecture and literature very much higher development than that of Babylonia, was always singularly self-centred. Babylonia was more concerned with practical life, and the application of knowledge to material. Babylonia, moreover, was always in contact with the world about it, and its civilization affected the civilization of surrounding regions to such an extent that it may fairly be claimed as the ancestor of later Western civilization. Egypt gave little to the outside world and received little from it, but, on the whole, what it received was greater than what it gave. It is Egyptian art, the painting on the Egyptian tombs, which gives us a vivid picture of the manner of Egyptian life; it is the innumerable clay tablets and business documents of Babylonia which enable us to restore in details the laws, rules, customs and commerce of the Babylonians.

The earliest civilization of Babylonia was non-Semitic, developed among a people commonly designated as Sumerian. The earliest inscriptions are written in the Sumerian language, and even as late as the Assyrian time magical and religious texts continued to be written in the same tongue. By about 3000 B.C. Semitic peoples, pouring out of Arabia, had overrun Babylonia and Syria and adopted and assimilated the civilization and religion of Sumerian Babylonia, which became by the middle or close of the 3d millennium B.C. to all intents and purposes, the civilization of the whole region from Persia on the east to the Mediterranean on the west.

In the 15th century B.C. a period of high culture having several independent centres, was reached in this ancient world. One of these centres was the Mycenæan or Ægæan civilization, having its central point in Crete and the islands and shores of the Ægæan Sea. So far at least as Crete was concerned, this had its own system of writing, which has not yet been deciphered. Another centre was Egypt at this period politically dominant in Syria, although the civilization and culture of the latter region continued to be Babylonian. Another centre was Babylonia, which had communicated its writing, its religion and its art to the neighboring regions of Elam, Mesopotamia, Syria, and, to some extent, Armenia and eastern Asia Minor. Perhaps we should add to these independent civilizations the Hittite, which, however, was much ruder than the rest. At this period a belt of civilization seems to have extended vaguely from China on the east to Spain on the west, and from the Danube on the north to Nubia on the south; but the highly civilized portion consisted only of the territory from Persia to Greece, and from the Hellespont to Ethiopia.

Then came a catastrophe similar in cause and result to the dark ages which followed the brilliant period of Græco-Roman civilization in the 4th and following centuries of our era. Barbarians, pressing in from the north and south alike, overwhelmed the Mycenæan-Ægæan civilization, reduced Egypt to a condition of depression, and for a time almost annihilated both Assyria and Babylonia. It was at this period that barbarian Aramæan hordes, pouring out of Arabia, overran all Syria, including Palestine. These dark ages may be said to have come to an end about 1000 B.C. At least at that time a new civilization begins to dawn. As to the dark ages of the Christian era we owe two great discoveries, one material and the other spiritual, which largely changed the character of the succeeding civilization, namely, gunpowder and the printing-press, so to these dark ages of the earlier time we owe the discovery of iron, or perhaps its adaptation to practical use, and the invention of a real alphabet, the so-called Phœnician alphabet. These two discoveries conditioned the new civilization which came into being at or about 1000 B.C. and which found its highest development to the westward in Greece and Rome from 500 B.C. onward.

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Oriental Society, American. See AMERICAN ORIENTAL SOCIETY.

Orienta'tion, the adjustment and maintenance of itself by an organism in its proper position toward its environment; the acts of perceiving, assuming, and controlling its normal attitude and movements in reference to gravitation, direction, equilibrium, and other requirements of its relations to space. The ability to keep right side up, to face or move in a determined direction, to place one's self as a whole in any desired attitude, to bring the various parts of the body into definite relations with other parts, to maintain equilibrium, and constantly to control and utilize this power, are the elements of the faculty of orientation, which seems in some degree necessary to every living thing, and whose phenomena in their higher manifestations surpass present human powers of explanation.

The faculty is essentially a mental perception of a necessity for a muscular act; but so incessant and habitual is it, at least in animals possessing the power of moving, that its exercise is ordinarily unconscious, and belongs to the realm of automatic reflexes, or at least to that of subliminal consciousness.

The proof of this appears in the partial inability of young animals, notably of the higher classes, to adjust themselves to their surroundings. Babies have to acquire a knowledge of relative direction, distance, and proportion by slow degrees. So simple a matter as bringing the hand to the mouth must be learned; the first difficulty in learning to walk is to acquire the power of maintaining equilibrium; and this must be acquired anew when a grown person attempts some novel method of locomotion, as skating or the riding of the bicycle. Proof appears also in the loss or destruction of the power of orientation which follows the derangement of the brain or nervous system by certain drugs or diseases. A symptom of intoxication is staggering, and when the intoxication is excessive ability to stand or to use the limbs definitely disappears,— the power of co-ordination is lost. Some forms of insanity have a similar effect; and a characteristic of the disease locomotor ataxia is that it deprives its victim of the power of control of equilibrium (q.v.) and of the muscles used in walking; it is not muscular weakness but disorganization of the power of co-ordination. If the affected person is able to walk at all he finds it impossible to turn without falling; or when he moves will start off at right angles to the course he intended to take. A similar defect of power accompanies great sleepiness — our heads droop and we totter and progress aimlessly until well aroused. Persons walking in the dark, with nothing to guide them but the touch of the feet upon the floor, find it hard to walk straightly or firmly. Orientation, then, that is the power to maintain a proper relative attitude, to comprehend direction, and to control locomotion, depends originally upon sensation and experience, combining many factors, both psychical and physiological, often not easily separable.

At the basis lies the faculty for equilibrium, the ability to feel and to keep one's self right side up. It is a notable fact that animals stricken with death when free to turn, as are those in the water, turn upon their backs — the part of the body that in life is kept away from the ground. This is a matter of gravity — the dorsal half of the body is the heavier. How do such creatures as fishes and low marine animals know how to resist this inclination in life, and hold themselves in the opposite or whatever may be their normal attitude toward the plane of the horizon? The only explanation is that they possess a sense of equilibrium which is supposed to reside primarily in certain organs, whose office is supplemented by various sensations, as of feeling, sight, and hearing, the influence of each varying in proportion according to the degree of nervous organization of the animal, its structure, size, shape, the medium in which it operates, etc. In the case of man and the animals nearest to him, balance is maintained by constant muscular response — in large part unconsciously, of course — to the wavering suggestions of pressure upon the soles of the feet or upon the bones and flesh of this side of the body or that, as the weight is shifted; to suggestions from the eyes in view of fixed objects, or from the ears as sounds vary in intensity, or even from the interior of the body, where organs or contained fluids report movements which must be corrected to restore the centre of gravity. The broad examples of this, which are matters of commonplace experience, such as the leaning away from a weight carried in one hand, or the outstretching of an arm to counteract a slip of the foot, or the swerving outward when rounding a curve at a rapid pace, are only large illustrations of the minute adjustments which go on incessantly in maintaining the equilibrium of animals. Underlying these adjustments, however, is the faculty, before alluded to, of perceiving when the body is in equilibrium, and this is believed to reside especially in certain organs represented in man by the labyrinth of the ear, and in the lower animals by the homologues of this structure. These are sufficiently described and illustrated in the article EAR, and consist essentially of some movable particle at the end of a nerve-filament, which, by its change of place as the body moves, informs the mind of the direction and degree of the departure from a state of equilibrium. Prominent among these special organs are those of the lateral line in fishes (see LATERAL LINE ORGANS), whose perceptions of vibrations make them akin to organs of hearing; but the higher purpose of which is believed to be equilibrial. With these and similar organs in the lower ranks of animals the complicated labyrinth of the ear in the higher vertebrates and in man is allied by descent; and unquestionably the semicircular canals are the seat of our perception or sense of levelness, change of direction, relative position, acceleration of movement, rotatory motion, and all the rest. The orientation of the body thus depends primarily upon the index furnished by the inner organs of the ear.

Whether this is to be regarded as a "sixth sense," as it is often styled, is by no means clear; but some of the manifestations of the power of animals and some men to perceive, take, and keep a course in the entire absence of anything in the way of guidance visible to human understanding, transcend our power of explanation at present. The extraordinary faculty which savages have inherited from primitive men of

finding their way through extensive forests or over wide plains that present no landmarks cannot be explained by the men themselves — they say they *feel* that the direction they follow is the right one, and become uneasy when they deviate from it. A similar explanation will alone account for the unerring manner in which birds migrate across hundreds of miles of open ocean to some island or point of coast annually revisited.

The literature of the subject is mainly French and German, the latest summary being Hartmann, 'Die Orientierung' (Leipsic 1902); and Loeb, 'Comparative Physiology of the Brain' (New York 1902).

Or'iflamme, the former royal standard of France, originally the church banner of the Abbey of Saint Denis, which was presented by the abbot to the lord protector of the convent whenever it was necessary to take up arms for the preservation of its rights and possessions. It was a piece of red taffeta fixed on a golden spear, in the form of a banner, and cut into three points, each of which was adorned with a tassel of green silk. When Philip I. afterward united Vexin to the possessions of the crown, it fell to him to bear the banner as protector of the abbey. It was then carried with the armies, and eventually became the great standard of the kingdom. Since the time of Charles VII. it has never been carried into battle.

Origen, ôr'ĭ-jĕn, ecclesiastical writer, surnamed ADAMANTIUS: b. Alexandria 185; d. Tyre 254. He was early instructed by his father in the Christian religion. His teachers were Clement of Alexandria and Ammonius. In his early youth he gave proofs of greatness of soul. When his father was thrown into prison during the persecution of Severus, Origen exhorted him to die rather than apostatize. After the martyrdom of his father in 202 he maintained his mother and sister by giving instructions in grammar. At 18 he was appointed to instruct the believers in Alexandria. Males and females crowded to his lectures. To escape calumny he mutilated himself, thinking the act justified by the New Testament, though afterward he expressed sorrow for the act. After the death of Severus (211) Origen went to Rome, where he gained friends and admirers, and subsequently, at the request of Bishop Demetrius, continued his instructions at Alexandria. A popular tumult compelled him to flee to Palestine. He was permitted by the bishops there to preach in their assemblies. On his way to Cesarea, in Palestine, he was ordained presbyter by the bishops who were there assembled. This laid the foundations for the persecutions which embittered the remainder of his life. Demetrius maintained that he alone had the right to ordain Origen. He deprived Origen of his priestly office, prohibited him from teaching in Alexandria, whither he had returned, banished and excommunicated him. This sentence was confirmed at Rome and by most of the other bishops. But the Churches of Greece and Asia sustained Origen, who denied that he was guilty of the errors of which he was accused. In the year 231 Demetrius died, and Origen enjoyed tranquillity. The persecution under Maximin forced him to remain for two years in concealment. When peace was restored to the Church in 237, he took advantage of it to travel to Athens. He then went to Arabia to refute Bishop Beryllus, who affirmed that the divine nature of Christ did not exist before his human nature. Beryllus recanted, and thanked Origen for his instructions. In the Decian persecution Origen was thrown into prison, and subjected to the extreme sufferings, from whose severity he died. Few authors have written so much as Origen; few men have been attacked with such virulence, both during his life and after his death. He was reproached with blending the Christian doctrines with Platonism, particularly in his book, 'De Principiis'; but he gives his opinions only as a possibility; moreover, "heretics," he says, "corrupted his writings." He has been accused, without reason, of favoring materialism. Of his works, besides the one just mentioned, there are extant only his 'Exhortation to Martyrdom,' commentaries, homilies, and scholia on the Holy Scriptures, nothing more of which we have than free translations. His critical talent is shown in his 'Hexapla,' of which an edition was published by Montfauçon, and afterward by F. Field (1875). In 1896 further portions of the 'Hexapla' were found at Milan. His work against Celsus is the most complete defense of Christianity of which antiquity can boast. His works were edited by Lommatzsch in 25 volumes. Consult: Möller, 'Geschichte der Kosmologie der Griechischen Kirche bis auf Origenes' (1860); Thomasius, 'Origenes' (1837); Freppel, 'Origène' (1868); Farrar, 'Lives of the Fathers' (1889); Fairweather, 'Origen and Greek Patristic Theology' (1901).

Or'igin of Species. See DARWINIAN THEORY.

Original Package, a term used in American Inter-State Commerce, arising from certain decisions of the United States Supreme Court, and having to do with the packages in which goods are shipped. In 1890 the Supreme Court, in the case of Leisy & Company *v.* Hardin, held that the plaintiffs, brewers in Illinois, had the right to bring beer into Iowa and sell it in the original packages, regardless of the Iowa prohibitory law. Their decision rested on the right of Congress to have exclusive control of interstate commerce. Congress passed an act, known as the Wilson Law, 8 Aug. 1890, giving the State control of the liquors so imported, though in the original packages.

Original Sin, the sin which all the descendants of Adam inherit from their first progenitor. The doctrine of Original Sin is a first postulate of Christianity in the scheme of man's redemption by Christ. The first explicit statement is to be found in Saint Paul (Rom. v. 12 *et seq.*): "As through one man sin came into the world, and death by sin, and so death penetrated to all men, because all sinned . . . for if by the trespass of one the many died, much more the grace and the gift in the grace of the one man Jesus Christ abounded to the many." The ante-Nicene Greek Fathers say little about the doctrine, and this only incidentally. When they do mention the subject it is always in the spirit of St. Paul's statement, that all mankind fell in Adam, and that through this first sin death entered into the world, the will became weakened, reason obscured, and concupiscence disordered. There is also little to be gathered

from the Latin Fathers of the ante-Nicene Age, for the doctrine had not become the subject of controversy, and so awakened but slight theological discussion or formulation. Wherever mentioned by them, the prevailing idea at bottom was the Pauline doctrine of the fall of the human race in Adam, with its dire consequences, which are to be remedied only by the grace and merits of Christ.

Saint Augustine (q.v.) was the first Latin Father to treat it systematically and extensively in his controversy with the Pelagians in relation to grace, free-will, predestination, etc. His teaching is succinctly stated in the following passage: "He (Adam), exiled after sin, bound his offspring also, which by sinning he had corrupted, as it were, in the root, under the penalty of death and condemnation, so that all progeny born of himself and his wife . . . should draw to itself original sin, and thence be drawn through diverse errors and pains to that last and endless torture with the angels, who deserted and corrupted (others), and with those who inherit and share in their portion." (Euchirid. ch. 10). Saint Augustine's exposition of the doctrine exercised a great and lasting influence throughout the subsequent centuries, and has been, in its broader outlines, followed by the theologians of the Middle Ages. A more definite and sccientific formulation grew up with the development of the stricter methods of scholastic philosophy, which reached its complete expansion in the 13th century. Saint Thomas Aquinas (q.v.), the greatest theologian of the scholastic period, declares that the essence of original sin consists in the "privation of original justice," understanding by original justice that state in which Adam was created and lived prior to the fall, with all the gifts of grace which God had bestowed upon him with the view to his supernatural end in ultimate possession of the Divine Vision. All this Adam forfeited when he fell, and that forfeiture passed by natural generation to all his descendants. In this view original sin is not a positive evil added to human nature, but the deprivation of a supernatural good originally bestowed upon the race in the headship of Adam. Following this original loss, as a penalty of Adam's transgression, came the direful consequences of death, the confusion and disorders of all the human faculties, and the sting of concupiscence. This is the accepted teaching of the Roman Catholic Church, and the Council of Trent defines as of faith, that Adam lost original justice, not only for himself, but also for us; that he "poured sin, which is the death of the soul, into the whole human race," and that this sin comes, not by imitation of Adam's transgression, but by propagation from him.

The reformers of the 16th century generally held to a very strict interpretation of the Augustinian view, and regarded original sin as a complete corruption of the will and reason. Luther held that it consisted in concupiscence. The Lutheran and the Reformed Churches both held similar views regarding original sin, following Calvin rather than Zwingli, who looked upon it as an evil or disease, and only as a sin when a commandment was thereby transgressed. The Arminians and Socinians, on the other hand, discountenanced the ecclesiastical view of the doctrine. While the Protestant Church maintained that Jesus alone was absolutely free from original sin, the Roman Catholic Church exempts the Virgin Mary from its dominion. Uniform adhesion to the Augustinian dogma on the part of the reformers was by no means the case. From Luther's dispute with Erasmus, who would only admit a weakness of the free-will and not its destruction, up to the present time the doctrine has been variously defended and attacked, philosophers as well as theologians taking part in the controversy. Kant showed the moral signification of the doctrine, and represented original sin as an inherent tendency in man's nature to evil. Rationalism, on the other hand, taught with Pelagius that it was only a weakness of man's nature with regard to knowledge and his power for good. According to Hegel original sin is nothing else than the necessary finitude and limitation of our nature. In recent times orthodox theologians, such as Olshausen, Hengstenberg, and others, have stood up for the Augustinian doctrine, while those of the liberal school have modified it in various ways. Consult: Müller, 'Christliche Lehre von der Sünde' (1888); Clemm, 'Christliche Lehre von der Sünde' (1897); Hodge, 'Systematic Theology' (1871); Landis, 'The Doctrine of Original Sin' (1885).

Orig'nal, the moose (q.v.), so called among the French-speaking people of eastern Canada.

Orillia, ō-rĭl'lĭ-a, Canada, a town and port of entry of Simcoe County, Ontario, at the head of Lake Couchiching, 64 miles north of Toronto by the Grand Trunk railway. Owing to the beauty of its surroundings and other attractions, it has become a favorite summer resort. It has steamboat communication with other ports on the lake and on Lake Simcoe, connected with Lake Couchiching by a narrow strait. The United States is represented by a consul. Pop. (1901) 4,907.

Orinoco, ō-rĭ-nō'kō, Venezuela, one of the three great South American rivers, rising in the Sierra Parima, on the Brazilian frontier, near lat. 3° 40′ N., lon. 64° W., and after a winding course of over 1,500 miles, during which it forms part of the boundary with Colombia, flowing into the Atlantic through a many-mouthed delta between lon. 60° 20′ and 62° 30′ W., opposite the island of Trinidad. The area of the drainage basin is estimated at 368,600 square miles. Its exact sources were not discovered until 1886. It flows at first west by north, a mountain stream, as far as lon. 67° W. A little below Esmeralda, in lon. 65° 50′ W., it divides and sends off to the south, the Cassiquiare, a natural canal 180 miles long with a rapid trend to the Rio Negro, a tributary of the Amazon. The Orinoco and Amazon are also connected by the Pimichin stream and the Terni branch of the Atabapo, an affluent of the Orinoco. Other important tributaries are the Guaviare, the Meta, Apure, Arauca, Caura, and Caroni. Two remarkable rapids occur in the upper parts of the Orinoco, called the Atures and Maypures, the one in lat. 5° 8′ N., the other about 36 miles lower down. These rapids consist of a countless number of little cascades succeeding each other like steps, and, where numerous, islands and

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Original, the moose (q.v.), so called among the French-speaking people of eastern Canada.

Orillia, ō-ril'lĭ-a, Canada, a town and port of entry of Simcoe County, Ontario, at the head of Lake Couchiching, 64 miles north of Toronto by the Grand Trunk railway. Owing to the beauty of its surroundings and other attractions it has become a favorite summer resort. It has steamboat communication with other ports on the lake and on Lake Simcoe, connected with Lake Couchiching by a narrow strait. The United States is represented by a consul. Pop. (1901) 4,907.

Orinoco, ō-rĭ-nō'kō, Venezuela, one of the three great South American rivers, rising in the Sierra Parima, on the Brazilian frontier, near lat. 3° 40′ N., lon. 64° W., and after a winding course of over 1,500 miles, during which it forms part of the boundary with Colombia, flowing into the Atlantic through a many-mouthed delta between lon. 60° 20′ and 62° 30′ W., opposite the island of Trinidad. The area of the drainage basin is estimated at 368,600 square miles. Its exact sources were not discovered until 1880. It flows at first west by north, a mountain stream, as far as lon. 67° W. A little below Esmeralda, in lon. 65° 50′ W., it divides and sends off to the south, the Cassiquiare, a natural canal 180 miles long with a rapid trend to the Rio Negro, a tributary of the Amazon. The Orinoco and Amazon are also connected by the Pimichin stream and the Terni branch of the Atabapo, an affluent of the Orinoco. Other important tributaries are the Guaviare, the Meta, Apure, Arauca, Caura, and Caroni. Two remarkable rapids occur in the upper parts of the Orinoco, called the Atures and Maypures, the one in lat. 5° 8′ N., the other about 30 miles lower down. These rapids consist of a countless number of little cascades succeeding each other like steps, and, where numerous, islands and

CHESTNUT-SIDED WARELER (above). BALTIMORE ORIOLE (below)

Mau

rocks so restrict the bed of the river that out of a breadth of 8,000 feet there only remains an open channel of 20 feet. From these rapids the river is navigable to its mouth, a distance of about 870 miles.

At 600 miles from the ocean it is from 5,000 to 6,000 yards wide; at Angostura or Ciudad Bolivar, 370 miles from its mouth, 7,500 yards; and in March 65 fathoms deep. About 120 miles from the Atlantic its delta of 8,500 square miles begins. Of the numerous mouths which reach the ocean over 165 miles of coast line, only seven are navigable. The waterway principally used by ocean-going vessels, which penetrate up to Ciudad Bolivar (Angostura), is the Boca de Navios, varying in width from 3¼ to 23 miles. Most of the larger affluents are also navigable for considerable distances, the Meta, for instance, to within 60 miles of Bogotá, the capital of Colombia. As a rule the river floods the districts adjoining its banks from May to January, the country under water sometimes measuring 100 miles across. The magnificence of the scenery on the banks of the Orinoco is beyond description. Forests of great extent are filled with aromatic trees; birds of beautiful plumage are common, and hordes of monkeys disport themselves among the branches. Beyond these forests enormous plains extend their verdant surfaces farther than the eye can reach. The whole course of the river is in Venezuela.

O'riole, any of certain passerine birds, distinguished by the predominance of a golden hue in their colors. The orioles of the Old and New Worlds belong to quite distinct families. The American orioles constitute, with the blackbirds, the meadow-larks, bobolinks, and cowbirds, the family *Icteridæ,* of which they are often considered to form a subfamily (*Icterinæ*), and which is related on the one hand, through the meadow-larks, to the starlings (*Sturnidæ*) of Europe, and on the other, through the bobolink, to the finches (*Fringillidæ*). From the other members of the family the orioles may be distinguished by the slender, acute, slightly decurved bill, small, weak feet, and the strongly contrasting black with yellow, golden or reddish colors of the males, and the usually plainer females. Practically all of the 40 or so species of American orioles belong to the typical genus *Icterus* whose species abound in tropical America, where they are called troupials. Within the limits of the United States seven species occur, but three of these are really Mexican birds which wander over our southwestern border, and another is a rare straggler from South America. Several of the tropical species are imported as cage-birds. The Baltimore oriole, golden robin or hangnest (*I. galbula*), the male of which bears the rich golden and black colors of Lord Baltimore's livery, is one of the best known and most conspicuous migratory birds of the east. It occupies the entire territory east of the Rocky Mountains, and northward into Canada, and in winter migrates to Central and South America. From the Rocky Mountains to the Pacific it is replaced by the closely related *I. bullocki.* The Baltimore oriole is noted alike for its great beauty, its vivaciousness, its clear, loud whistle constantly repeated in May and June, and its skilfully woven, pensile nest, formed of grasses and fibres and suspended from the endmost twigs of high branches, often of elm and sycamore trees.

The orchard oriole (*I. spurius*) has a similar range somewhat curtailed northward and westward. It is a smaller bird, and the adult male is black and reddish chestnut, but assumes these colors only when three years old; the young male resembles the female in being dull yellow, but in the second year has a black face and throat. In habits it generally resembles the Baltimore oriole, but is preeminently a denizen of orchards, and its song, nest and eggs all present specific differences.

The orioles of Europe and of the Old World generally, except Africa, belong to the family *Oriolidæ,* which is related to the birds-of-Paradise. The best known species is the golden oriole, which has a stout bill and bright yellow plumage with black wings and tail. Like our orioles it constructs a hanging nest. Certain species of orioles of the genus *Mimeta,* inhabiting islands of the Malay Archipelago, so exactly resemble associated species of friar-bird (*Philemon*) that Wallace considers them to be true mimics.

Consult American and European Ornithologies generally; Jordan, 'Birds of India' (1862); Wallace, 'Tropical Nature' (1878).

Orión, ō-rē-ōn', Philippines, a pueblo of the province of Bataán, Luzon, situated near the west shore of Manila Bay, five miles south of Balango. It is on the principal road of the province. Pop. 10,370.

Orion, ō-rī'ŏn, (1) in astronomy, one of Ptolemy's constellations and the most marked in the heavens. It is divided by the equator into two nearly equal portions. When all its bright stars are known, many of the surrounding ones may readily be found by alignments; (2) in Greek mythology, a heroic youth, son of Hyrieus of Hyria. Eōs became enamored of him. The gods were jealous of her love, and Artemis slew him with her arrows in the Island of Ortygia. He was of such gigantic size that when standing in the middle of the sea the water only reached his shoulders. According to another legend, he died of the sting of a scorpion.

Oriskany, ō-rīs'kā-nĭ, **Battle of,** in American history, an engagement between the British and Indians and the American forces, near Oriskany, N. Y., 10 miles from Fort Stanwix, 6 Aug. 1777. The opposing forces each numbered about 800 men. The Americans, under General Herkimer, started to relieve Fort Stanwix, which was besieged by Saint Leger, Brant and his Indians. At Oriskany he halted and attempted to concert an attack and a sortie. The plan miscarried. Herkimer advanced and was attacked by the Indians and Tories in a deep ravine. The battle raged furiously for hours, despite a terrific thunderstorm, and was one of the most cruel and bloody of the Revolutionary War. Each side lost a third of its number. The Americans remained masters of the field, although badly disabled. The sortie from the fort was a success, and badly crippled the enemy. Gen. Herkimer was mortally wounded in the battle and died several days later.

Oriskany Stage, in geology, the lowest group of the Devonian system, so called from Oriskany Falls, N. Y., northeast of Utica, and

apparently the northern limit of the stage in New York, the name being due to the New York Geological Survey. In Maine it is several thousand feet thick, but is much thinner in western New Jersey, eastern Pennsylvania, Maryland, Virginia, and West Virginia. It also occurs in Ontario, and crops out in southern Illinois. Its rocks are calcareous sandstone or arenaceous limestone, containing a few fossils such as crinoids, cystoids, brachiopods, gastropods, and trilobites. Iron ore is found in the rocks of this stage in Virginia.

Orizaba, ō-rē-sä'bä, Mexico, a town of Vera Cruz, the former capital of the state, 70 miles by rail southwest of Vera Cruz, and 180 miles southeast of Mexico. It is situated at an elevation of 4,030 feet above sea-level in a fertile garden country surrounded by mountains, chief of which is the volcanic Orizaba (q.v.), 25 miles to the northwest. It is a rapidly-improving trade centre; tobacco grown in the neighborhood is extensively manufactured, and there are also cotton factories, flour- and paper-mills, and railway shops. Orizaba occupies the site of the Nahuatl town, Ahanializapan, signifying "pleasant waters." Pop. (1895) 31,512.

Orizaba, Mexico, a volcanic peak, 60 miles west of Vera Cruz, on the boundary between the states of Puebla and Vera Cruz. It was called by the ancient Mexicans Citlaltipetl, or Mountain of the Star (from *citlalin,* star, and *tepetl,* mountain), probably from the circumstance that when in a state of eruption the flame at its summit appeared, when seen from a distance, like an immense star on the verge of the horizon. It has an altitude of 18,200 feet, and is the first land visible on approaching the coast in the direction of Vera Cruz. Its most considerable eruptions known to history took place between 1545 and 1566. In common with the other great volcanoes of Mexico, Popocatepetl, Tuxtla, Jorullo, and Colima, it seems to have lost most of its activity, and to be in a state of repose. The form of Orizaba is that of an exact cone, truncated at its summit. From the forest line of 13,500 feet its top is covered with eternal snow, and the sides are so steep as to be very difficult of ascent. The first ascent on record was made in May 1848 by Lieutenants Reynolds and Maynard of the United States Army.

Orkney (ôrk'nĭ) **Islands,** Scotland, an archipelago forming a single county, separated from the northern coast of Caithness, by the Pentland Firth, from six to eight miles broad. There are in all about thirteen islands of considerable size, with a number of smaller dispersed over the archipelago. They extend from lat. 58° 42′ to 59° 23′ N.; lon. 2° 22′ and 3° 25′ W.; aggregate area, 390 square miles, or 249,565 acres, of which about 107,000 are under culture. Among the larger islands are Pomona or Mainland, Hoy, South and North Ronaldsay, Westray, Sanday, Eday, Stronsay, Ronsay, and Shapinsay. Of the whole about 28 are usually inhabited, although five or six do not contain a dozen inhabitants each. Hoy is the only island of the group that can be called mountainous, and here the highest elevation is but 1,600 feet. With the exception of a granitic district near Stromness, the islands are of old red sandstone formation. There is abundance of clay and peat-moss; in many places marl, and in some bog-iron ore. There are no streams deserving the name of rivers, but springs of good water are abundant; and there are many lakes, the largest of which, Stennis, in Mainland, is 14 miles in circumference. Chalybeate springs are not uncommon. The climate is moist, but not cold, being tempered by the Gulf Stream that sweeps around the shores. In winter storms of sleet and rain are frequent, but in summer the weather is generally fine and steady. Oats, turnips, and hay are the chief crops, and 16,000 acres of land are devoted to permanent pasture. The common breeds of sheep, cattle, and horses were small, but since the introduction of good stock from the south, have become large and valuable. Rabbits and poultry are numerous. The herring and cod fisheries compensate in some parts the absence or defective development of other resources, and large numbers of lobsters are annually sent to London. The principal manufactures are hosiery, made by the females, and the building of boats, making of sails, nets, and cordage. The chief town is Kirkwall, which has regular steam communication with Aberdeen and Leith.

As the Orcades mention is made of the islands by several ancient geographers and classical writers, Ptolemy, Pliny the Elder, Mela, Solinus and others; the prehistoric monuments include the Stennis monoliths, the Mæshowe tumulus, and a Pictish fort. It is probable that the Picts possessed the islands until the subversion of the Pictish kingdom in Scotland by Kenneth II. In 1099 they were assigned by King Donald Bane to the king of Norway and remained in possession of the Norwegians until the middle of the 13th century, when Magnus, king of Norway, transferred them to Alexander, king of Scotland. The inhabitants are to a considerable extent of Scandinavian blood. Pop. (1901) 28,698.

Consult: Tudor, 'The Orkneys and Shetland' (1883); Wallace, 'The Isles of Orkney' (1884).

Orlando, ôr-lăn'dō, Florida, city, county-seat of Orange County; on railroads owned by the Seaboard Air Line Railway Company and the Plant System, about 100 miles south by west of Saint Augustine. It is in a fruit growing region and its principal industries are connected with the marketing of the fruit of the surrounding country. It is a favorite winter resort on account of its climate. Pop. (1890) 2,856; (1900) 2,481.

Orlando Furioso, ôr-lăn'dō foo-rē-ō'sō (Italian, "Orlando Mad," or "Mad Roland"), a romantic poem by Ariosto, of which 40 cantos were published in 1516, and to which the author added six more, the whole poem being published in 1532. It is a continuation of Boiardo's 'Orlando Innamorato' ('Orlando in Love'), and is a somewhat ironical romance of chivalry. See Ariosto, Ludovico; Boiardo, Matteo Maria.

Orlando Innamorato, ēn-nä-mō-rä'tō (Italian, "Orlando in Love"), a poetical romance by Matteo Maria Boiardo (q.v.), the subject of which is the love of Orlando or Roland for Angelica. Unfinished by the author, it was continued by Ariosto in his 'Orlando Furioso' (q.v.).

Orléans, ôr'lē-ąnz (Fr. ôr-lā-äṅ), the name of several princely houses of France, lords of the county (later the duchy) of Orléans. In

MOUNT ORIZABA, FROM THE FOOT-HILLS NEAR CHALCHICOMULA.

MOUNT ORIZABA, SOUTH SIDE OF THE PEAK.

Mau

1344 it was an appanage of the cadet branch of the reigning Valois, and under the Bourbons it held a corresponding place. The various families of Orléans may be distinguished as follows: 1st, dating from 1344, containing the single name of Philippe, who was 4th son of Philip VI. and died in 1375, his 40th year, without legitimate heirs, the duchy therefore reverting to the crown; 2d, dating from 1391, when Louis, Count of Valois, b. 1372, d. 1407, received the duchy from his brother, Charles VI., and terminated in 1498 by the accession of the then incumbent to the throne as Louis XII.; this Louis (q.v.) was son of the poet Charles of Orléans (see ORLÉANS, CHARLES, DUKE OF); the 3d, like the first, began and ended with a single duke, Jean Baptiste Gaston (q.v.), brother of Louis XIII., who held it from 1626 to 1660; the 4th important grant of the title was to Philippe, brother of Louis XIV., b. 21 Sept. 1640; d. 9 June 1701, the founder of the House of Orléans-Bourbon, of which only one member has been king of France, namely Louis Philippe (q.v.). To this house the Orleanist claimants of the French throne belong.

Orléans, Charles, DUKE OF, commonly called CHARLES D'ORLÉANS, French poet and soldier, count of Angoulème: b. Paris 26 May 1391; d. Amboise 4 Jan. 1465. He succeeded to the duchy in 1407 on the death of his father, Louis, and like him took a prominent place in French politics, becoming a leader of the party opposing Burgundy and England. Wounded at Agincourt in 1415, he was taken captive to England and imprisoned there, probably with little or no severity, being so important a hostage, until 1439. He then married Marie de Clèves, niece of Philippe the Good of Burgundy and thus aroused suspicion against himself at court, where alliances with Burgundy were not looked upon with favor. Charles d'Orléans spent his last years in seclusion from public activity, but was famed as an entertainer and hospitable patron of poets and artists. His poems, including chansons, rondeaux, ballades, etc., some in French, some in Latin, and some in English, written during his captivity, are intensely subjective, entirely free from patriotic feeling or any thought save for his own sorrows, joys and loves; they were edited by d'Hericault (1874). Consult Beaufils, 'Etude sur la Vie et les Poésies de Charles d'Orléans' (1861).

Orléans, Helène Louise Elizabeth, DUCHESS OF, wife of the Duke of Orléans, Ferdinand, son of Louis of Philippe: b. Ludwigslust 24 Jan. 1814; d. Richmond, England, 18 May 1858. The daughter of Friedrich Ludwig, Grand Duke of Mecklenburg-Schwerin, she married 30 May 1837, lost her husband 13 July 1842, and devoted herself to the education of her sons, the Comte de Paris (see PARIS, LOUIS PHILIPPE ALBERT, COMTE DE), and the Duc de Chartres, in whose behalf in 1848, after the abdication of Louis Philippe, their grandfather, she appealed in vain to the National Assembly. She removed, first to Ems, then to Eisenach, and finally to England. She was a model of German wifely virtues and a woman of many accomplishments. Consult the popular biography in German by Schubert (8th ed. 1877).

Orléans, Henri, ŏñ-rē, PRINCE OF, French explorer, eldest son of Robert, Duc de Chartres: b. Ham, near Richmond, Surrey, England, 6 Oct. 1867; d. Saigon, Indo-China, 9 Aug. 1901. At 22 with Bonvalot he traveled through central Asia to Tonquin; received the medal of the French Geographical Society in 1890, having traveled through India, Afghanistan, and Japan in the interval; and in the next six years explored Abyssinia (1891), Laos and Siam, Madagascar (1894), and Tibet and Yunnan (1895-6), discovering the sources of the Irawady on this last journey. He gained great popularity in France, notably by his bold colonial policy, which was a constant source of irritation to England; and yet his bid for the favor of the army in his defense of it during the Dreyfus case was unsuccessful, being rather too open. His experiences in Abyssinia led him to criticise harshly the Italian officers in captivity there, and in 1897 he was challenged to a duel and wounded by the Count of Turin. Early in 1901 he left France for Annan, where he died in August. He wrote: 'Six Mois aux Indes' (1889); 'De Paris au Tonkin et travers le Thibet inconnu' (1891); 'Une Excursion en Indo-Chine' (1892); 'Autour du Tonkin' (1893); and 'A Madagascar' (1895).

Orléans, Jean Baptiste Gaston, zhŏñ bätēst gäs-tôñ, DUKE OF, third son of Henry IV. of France, and brother of Louis XIII.: b. Fontainebleau 25 April 1608; d. Blois 2 Feb. 1660. His character was weak and yielding, and he was continually involved in plots, first against his brother, Louis XIII., and Richelieu, and then against Anne of Austria and Mazarin. In 1626 he refused to marry Mlle. de Montpensier at Richelieu's bidding, being a mere tool of the Cardinal's enemies at court, and entered a conspiracy against Richelieu's life, which was discovered and crushed. The Duke lived temporarily at peace with Richelieu, only to join Marie de' Medici, his mother, in a new intrigue against the minister in 1631, which resulted in the complete triumph of Richelieu, and the flight of the Duke to Lorraine. There in 1631 he married Marguerite, sister of Charles IV., Duke of Lorraine. He returned to France in 1634; plotted to kill Richelieu in 1636, purchasing his own pardon by sacrificing the lives of his accomplices; joined the plot of Cinq Mars in 1642, but again escaped punishment; and after the death of Louis XIII. became lieutenant-general of the realm (1643). But his part in the Fronde, where he was clearly the tool of De Retz, was too flagrant to be passed over and in 1652 he was banished from court to Blois. Consult his 'Memoirs,' written by Mlle. de Montpensier (q.v.).

Orléans, Louis Albert Philippe, COMTE DE PARIS. See PARIS, LOUIS ALBERT PHILIPPE, COMTE DE.

Orléans, Louis Philippe Joseph, loo-ē fē-lēp zhō-zĕf, DUKE OF, great-grandson of the Regent of France, Philippe, Duke of Orléans: b. St. Cloud 13 April 1747; d. Paris 6 Nov. 1793. Duke of Montpensier during his grandfather's last years, and from 1752 to 1785 Duke of Chartres, he succeeded his father in the last named year, having married in 1769 Louise Marie Adélaide, daughter of the Duke of Penthièvre, and having shown himself a voluptuary like the Regent and governed by strange whims. The accusation of cowardice brought against

him for his part in the battle of Ouessant and the refusal to make him grand-admiral, in spite of his hereditary right to that post, made him a bitter enemy of the court; in 1787 he was a member of the Assembly of Notables, and was exiled as a result. With the approach of the Revolution he gave up his rank, became a pronounced republican, joined the Jacobins (1789), assumed the name of Citizen Philip Egalité, voted with some degree of moderation in the Constituent Assembly, but in the convention joined the Mountain and voted for the death of the king. This action seems to have opened the eyes of his colleagues to his apparent desire to be made king himself, and 6 April 1793 the arrest of all members of the Orléans family was voted by the Convention. He was declared innocent by the tribunal of the Department Bouches du Rhône; but was found guilty of conspiracy against the integrity of the Republic, upon no good evidence, it seems, by the Revolutionary Tribunal, and died bravely. Consult the exhaustive article by Monin in 'La Grande Encyclopédie'; and the biographies by Tournois (1842–3), Montjoie (1796), Ducoin (1845), and Crétineaus-Joly (1862); also Carlyle, 'French Revolution.'

Orléans, Louis Philippe Robert, rō-bār, DUKE OF, present Orleanist claimant to the French crown, son of the Comte de Paris: b. Twickenham, England, 6 Feb. 1869. He was educated in France, was exiled by the law of 23 June 1886, and in 1890 to rouse Orleanist sympathy returned to France and attempted to enter the army. He was sentenced to four years' imprisonment on 6 Feb. 1890, but was pardoned and sent out of France in June of the same year, the government realizing that his punishment might aid the royalist cause. In 1894 upon the death of his father he became the recognized leader of the Royalists; he married 5 Nov. 1896 Maria Dorothea, archduchess of Austria.

Orléans, Philippe, DUKE OF, son of Louis XIII., styled 'Monsieur' during the reign of his brother Louis XIV.: b. St. Germain 21 Sept. 1640; d. St. Cloud 9 June 1701. Originally Duke of Anjou, in 1660 he succeeded Jean Baptiste Gaston, Duke of Orléans (q.v.), his uncle; in 1661 married Henrietta, sister of Charles II. of England, of whom he was very jealous, even resenting the favor shown her by Louis, who made use of her in effecting his alliance with the English king in 1670. Henrietta died in the same year, possibly poisoned; and in 1671 the Duke married Charlotte Elizabeth, daughter of the Elector Palatine. He fought in the Netherlands against William of Orange with such success that his royal brother relieved him of command, fearing his growing prestige. His two daughters by his first marriage were Marie Louise (1662–89), wife of Charles II. of Spain, and Anne Marie (1669–1728), wife of Victor Amadeus of Savoy; by the second marriage he had a son, Philippe (q.v.), and a daughter Elizabeth Charlotte (1676–1744), who married in 1698 Leopold of Lorraine.

Orléans, Philippe, DUKE OF, son of the preceding, and regent of France: b. St. Cloud 2 Aug. 1674; d. Versailles 2 Dec. 1723. According to the custom established by his father he bore the title of Duc de Chartres as eldest (only) son. He was able but somewhat profligate; married in 1692 at the wish of Louis XIV., Mlle. de Blois, the king's daughter by Mme. de Montespan; quickly made himself famous as a soldier by his exploits at Mons (1691), Steenkirk (1692) and Neerwinden (1693); and like his father was practically removed from the army because of the spite of Louis XIV. until his father's death. He was defeated at Turin in 1706 by Prince Eugene, but more than regained his laurels in Spain in 1708 by the brilliant capture of Lerida. His success and the rumor of intrigues with the English to make him king of Spain enforced renewed retirement in 1708. The successive deaths of the Dauphin and the Duke and Duchess of Burgundy and their son in 1711–12 were laid by gossips to his door, but he seems to have been more occupied at this time with alchemy, arts, letters, and a life of pleasure than with politics. By right of birth he became (1715) regent during the minority of Louis XV. His policy was bold, quite the reverse in its details from that of Louis XIV.; he restored the power of the nobles; withdrew laws against Protestants; aimed at canceling the revocation of the Edict of Nantes; joined the Quadruple Alliance, and in other ways showed himself a friend of England; attempted to reform French finance, but made bad worse by acting on the advice of John Law (q.v.); and even after 1723 when the king came of age retained much actual power for a time through Dubois, whom he had made prime minister. His vicious and debauched habits were not broken nor changed in his later years, and he was accused, apparently with right, of criminal intercourse even with his own daughter, the Duchesse de Berry. Consult the biographies by La Motte, Capefigue, and Baudrillart; and the histories of the regency by Lemontey, Piossens, Marmontel, Lacretelle, and Wiesener; as well as the 'Mémoires' of St. Simon, Marais, and Buvat.

Orléans, France, a city, capital of the department of the Loiret, situated on the right bank of the Loire, 68 miles southwest of Paris. A magnificent bridge of nine arches connects it with the populous faubourg of St. Marceau. The houses are well-built, but the streets in general are narrow and crooked. It has some handsome public squares, a Gothic cathedral; two hôtels-de-ville; the Palais de Justice; the Musée, containing a curious collection of local antiquities; the theatre, and other edifices worthy of notice. The manufactures and trade of the place are considerable, but have lost much of their former importance; there are several worsted and cotton mills, numerous sugar-refineries, vinegar works, breweries, and manufactures of hosiery, ironmongery, pottery, etc. Orléans was the Gallic Genabum destroyed by Cæsar 52 B.C., and rebuilt as Aurelianum, whence the corruption Orléans. Philip of Valois erected Orléans into a duchy and peerage in favor of his son, and Orléans has since continued to give the title of duke to a prince of the royal line of France. Philip the Fair instituted a university here in 1312, which formerly had great celebrity. In 1428 the city sustained a siege against the English, and was relieved by

the Maid of Orléans (see JOAN OF ARC), whose statue in bronze stands in one of the public squares. It was taken and retaken more than once in the Franco-German war in the latter part of 1870. Pop. (1901) 67,539.

Orléans, Isle of, Canada, in the Saint Lawrence River, below Quebec and Levis, at the head of the estuary, 650 miles from the ocean at Cabot Strait. It is dependent to Montgomery County, is about 22 miles long by five to six broad, and has an area of 70 square miles. On account of its numerous grape vines Jacques Cartier first named it the Isle of Bacchus, in 1535. The soil is fertile, well-wooded, and fruit culture is the chief industry. The villages along its shores are popular picnic and summer resorts, and include Beaulieu, St. Pierre, Ste. Famille, St. François, St. Jean, St. Laurent, d'Orléans being usually affixed to particularize them. General Wolfe encamped here in 1759 before the siege of Quebec. Pop. about 6,000.

Orleans, Territory of, in American history, a name formerly applied to a section of the United States. When the large tract of northwest territory was purchased from France by the United States in 1804, under the name of Louisiana, the district was divided by Congress into territories, called the District of Louisiana and the Territory of Orleans, the latter being the present area of the State of Louisiana. In February 1811, an act was passed "to enable the people of the Territory of Orleans to form a constitution and State Government," and on 12 April 1812 an act was passed for the admission of the State of Louisiana into the Union. See LOUISIANA.

Orley, ôr'lī, **Bernaert** (BAREND, BERNHARD) **van,** Dutch painter: b. Brussels 1491 or 1492; d. there 6 Jan. 1542. He studied in Italy between 1509 and 1515 and imitated the Italian masters, especially Raphael. Returning to Brussels he was appointed court painter to Margaret of Parma (1515) and to her successor Maria of Hungary (1820). While he began his career as a follower of Gerard David he altered it after his Italian travels, but in his modeling and color scheme he never forsook the traditions of the Dutch school. His works indicate keen power of observation and a delicate perception of beauty in form and expression. Among the best of them are: 'Scenes from the Life of Saint Thomas and Saint Matthew' (altarpiece), in the Imperial Museum, Berlin; 'Sorrows of Job' (triptych) in the Brussels Museum; 'The Flight into Egypt' (in the Liverpool Royal Institution); 'Worship of the Holy Trinity' (Lübeck, Saint Mary's Church); and 'The Holy Family' (in the Dresden Gallery). He also furnished designs for wall hangings which were executed in Brussels tapestry, of which there is an example in the Louvre, 'The Imperial Hunt,' executed for the Emperor Charles V.

Orloff, ôr-lŏf', a Russian noble family, founded 1689 by Ivan, who was condemned to death by Peter the Great, but pardoned for his bravery and coolness. His grandson GRIGORI (1734–83), fought in the Seven Years' war, became the paramour of Catherine II., to whom he gave the famous Orloff diamond, or Koh-i-Nur, weighing 193 carats, and now a crown jewel. But she dismissed him for Potemkin. His brother ALEXEI (1737–1808) plotted against Peter III., and in 1770 won the battle of Tchesme and the name Tchesmensky. The Orloff breed of horses is named after him and is a cross of his introduction into Russia. GRIGORI VLADIMIR (1777–1826) spent his last years in Paris, wrote in French on Italian history, and edited a polyglot Kryloff. ALEXEI FEDOROVITCH (1781–1861), a general in the Napoleonic wars, and a famous diplomat, in 1833 effected the Treaty of Unkiar-Skelessi, giving Russia the sole right to pass the Dardanelles. His son NIKOLAI (1827–85) advocated religious toleration and the abolition of corporal punishment.

Orloff (ôr'lŏf) **Diamond, The.** See DIAMOND; ORLOFF.

Or'lop-deck, in naval architecture, the lowest deck, consisting of a platform laid over the beams in the hold of a ship of war, whereon the cables were usually coiled, and containing also cabins and storerooms. In merchant vessels it is often a temporary deck.

Ormazd, ôr'măzd. See ORMUZD.

Ormerod, ôr'mĕ-rŏd, **Eleanor Anne,** English entomologist: b. Sedbury Park, Gloucestershire, 11 May 1828; d. St. Albans, England, 19 July 1901. She acquired her knowledge of entomology through her own investigations, devoting herself especially to the study of injurious insects. Her advice was sought, and specimens of harmful insects were sent her from all over the world. In 1878 she was elected to a fellowship in the Meteorological Society, the first woman to be thus honored, and in 1882 was appointed honorary consulting entomologist to the Royal Agricultural Society. She published: 'Cobham Journals' (1879); 'Guide to Insect Life' (1884); 'Annual Reports of Observations on Injurious Farm Insects' (1877 et seq.); etc.

Ormoc, ŏr-mŏk', Philippines, a pueblo of the island of Leyte, situated on the Bay of Ormoc, on the western coast of the island, 35 miles southwest of Tacloban. It is surrounded by a stone breastwork with three ruined forts. It has an important hemp trade. The Bay of Ormoc affords the only safe anchorage on the west coast of Leyte during typhoons. Pop. 8,200.

Or'molu (French *or moulu,* "ground gold"), in the etymological meaning of the word, ground gold leaf used as a gilt pigment; and by an extension of the term a compound of copper, zinc, and tin (sometimes called "mosaic gold"; or a paste of mercury and gold, used for gilding.

Ormond, ôr'mŭnd, **Alexander Thomas,** American philosophical writer: b. Punxsutawney, Pa., 26 April 1847. He was graduated from Princeton in 1877; was professor of philosophy and history in the University of Minnesota 1880–3; of mental science and logic at Princeton 1883–98; and McCosh professor of philosophy at the latter institution from the last named date. He has published 'Basal Concepts in Philosophy'; 'Foundations of Knowledge' (1900).

Ormond, Duke of. See BUTLER, JAMES.

Ormulum, ôr'mū-lŭm, in early English literature, an English metrical translation of the Gospel history. See ENGLISH LITERATURE.

Ormuz, ôr'mŭz, or **Hormuz,** an island in the Persian Gulf, on the north side, near its entrance. It is about 15 miles in circumference, has a rugged appearance, is entirely destitute of vegetation, has several of the high peaks white from an incrustation of salt, and abounds in iron, copper-ore, and rock-salt. Ormuz was once the emporium of all the riches of India, the receptacle for the gems of Samarkand and Bokhara, and for the manufactures of Europe and Asia. The Portuguese had possession of it from 1515 to 1622, when it was captured by the English and given to the Shah of Persia, who dismantled the city, transferring its commerce to Bender Abbas, on the opposite coast. The town of Ormuz stood on a plain on the north side of the island; and although now only a few scattered ruins, it once contained 4,000 houses.

Ormuzd, ôr'mŭzd, or **Ormazd,** supreme deity, literally "Lord Wisdom," in the Zoroastrian religion. The word is a broken down form of the Avestan "Ahura Mazda" and the old Persian "Auramazda," and these three forms are interchangeable in modern usage. He is the good principle, who is continually at war with Ahriman, the bad principle, and the Zoroastrian conception of him was a very noble one, free from any traces of anthropomorphism and from many recollections of nature worship. The influence of this concept on Judaism and Christianity was undoubtedly great, and Ormuzd approaches closely to Jehovah as a high type of the ideal of a national religion. Consult: Darmesteter, 'Ormazd et Ahriman' (1887). See AVESTAN; ZOROASTER; ZOROASTRIANISM.

Ornamental Grasses. See GRASSES OF THE UNITED STATES.

Or"nithodel'phia. See MONOTREMATA.

Ornithol'ogists' Union, American. See AMERICAN ORNITHOLOGISTS' UNION.

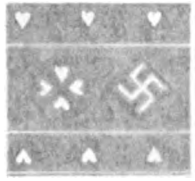
Ornithology, the science which treats of birds. It is susceptible of such a broad interpretation that it is difficult to define its limits with accuracy, and of late years certain of its branches have become to such an extent matters of popular interest that we are coming to use the term "bird study" to distinguish them from purely scientific ornithology. Ornithology proper, then, may be said to treat of the classification of birds,— both the phylogeny of the group as a whole and the definition of the numerous species and varieties — which involves anatomical, morphological, embryological, and physiological investigations and studies of both the living and dead bird. Geographic distribution and migration also form an important branch of ornithology, and though the former pertains equally to other branches of zoology, as well as to botany, it has nevertheless been studied very largely from the side of the birds.

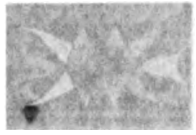
Structure.— Birds, being eminently aerial, the anterior pair of limbs are modified into wings, and the bones of the hand are so much reduced that portions of two digits only remain. The peculiarities of feathers and other accessories to flight are described elsewhere. See FLIGHT; PLUMAGE.

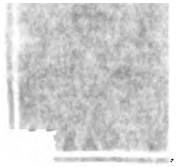
Considering other peculiarities in the general structure of birds, we find the skull bones to be united to a remarkable degree, so that almost all traces of the components are lost. In the head of the adult bird, besides the skull proper and the lower jaw, are only four separate bones, excepting the hyoids, which support the tongue. These are the two *quadrates,* which lie between the articulating surface of the lower jaw and the skull — a peculiarity of birds as compared with mammals, in which the mandibles articulate directly with the skull; and the two *pterygoids,* which connect the quadrates with the palate. The eye of birds is relatively very large, and the ear is situated rather below and behind it, but does not protrude externally and the location of the opening is not noticeable, except for the slightly different sort of feathers which usually cover it. No living birds are provided with teeth, the mandibles being covered with a horny sheath forming the bill, which has sharp cutting edges, and is wonderfully modified in form, according to the habits of the various species. The feet of birds show even a greater degree of adaptive modification than the bill, and inasmuch as these two are the only parts of a bird not covered by feathers, it is not surprising that all the older classifications were founded almost exclusively upon them. The ankle bones (as well as the bones of the wrist) are lost very early in the development of the bird, and become entirely combined with the ends of the adjoining bones, so that the so-called tarsus, a fusion of all the tarsal bones, includes, in addition, the metatarsal elements, and is more properly known as the "tarso-metatarsus." The fibula in most birds is more or less reduced, the lower portion ending in a sharp point, and not reaching the end of the tibia, as is familiar to us in the "drum-stick" of the chicken. The femur and a large portion of the tibia are covered by the skin of the body so that the entire external part of the bird's leg is in reality the foot. The long "tarsus" with its usual horny covering corresponding to the flat portion of the human foot, while the bend where the feathering begins is the heel. In other words, the average bird carries its heel high up in the air and walks or grasps with the toes, which are at the other end of a very long instep. The toes themselves are never more than four,— usually one directed backward and three forward, making a grasping foot. Sometimes, however, one of the front toes is reversed, as in the woodpeckers, or all may point forward, as in some swifts. Certain woodpeckers have but three toes, while all birds which habitually walk, and most of those that swim, exhibit a great reduction or total loss of the hind toe.

The modifications in webbing and other peculiarities of foot-structure are very numerous. Most swimmers have two webs, uniting the three functional toes, while the cormorants, pelicans, etc., in which the hind toe is well developed, have three webs.

The neck of birds is usually long, the vertebræ moving easily upon one another, so as to permit great flexibility. The body-cavity is well encased by the bony structure, but owing to the length and construction of the ribs is likewise very flexible. Its most peculiar characteristic is the remarkable development of the sternum or breast-bone, which is expanded into a broad, flat







Ornamental Grasses. See GRASSES, ORNAMENTAL.

Ornithichnites. See MENOPOMA.

Ornithologists' Union, American. See AMERICAN ORNITHOLOGISTS' UNION.

Ornithology, the [illegible] which treats [illegible] is capable of such [illegible] tion that it is difficult to define its [illegible] with accuracy, and of the [illegible] portion of its [illegible] have come to such an extent matters of [illegible] interest that [illegible] these [illegible] to distinguish them from [illegible] such as the study of the classification of [illegible] to the discovery of the means as a science and [illegible] creation of the numerous species [illegible] which involves anatomy, morphology, embryological, and physiological [illegible] consideration of the habits and distribution. Geographical distribution and migration [illegible] form important branches of ornithology, and [illegible] are pursued equally to other branches of zoology, as well as to botany, it has [illegible] been studied very largely [illegible] by [illegible] of the birds.

Structure.—[illegible] of birds [illegible] the anterior pair of limbs are modified into wings, and the bones of the hand are so much reduced that portions of two digits only remain. The peculiarities of feathers and other [illegible] structures are described elsewhere. See FEATHERS; [illegible]

[illegible] other peculiarities [illegible] we shall [illegible] [illegible] of the [illegible] [illegible] [illegible]

Arabic, Byzantine, and European Designs of the 15th and 16th Centuries.

Uofm

structure. Sometimes, as in the ostriches and their allies, it is smooth on the anterior surface, but in other living birds it is provided with a vertical keel. It is to this that the great flight-muscles of the breast are attached; and while the presence or absence of a keel was formerly looked upon as of primary importance in tracing the ancestry of birds, it is now regarded more as an indication of the extent to which the power of flight has been lost. On the back of the body cavity is another solid, bony structure known as the sacrum, formed by the fusion of the lower vertebræ and the pelvis. The clavicles or "collar bones" of a bird also present a peculiar appearance, being usually firmly ossified at their lower extremities, forming a V-shaped bone known as the furculum or popularly the "wish-bone."

As to the soft anatomy of birds, a characteristic avian structure is seen in the thick-walled muscular gizzard, which is a prominent feature of the stomach of all birds which devour hard substances such as grain, horny insects, etc., though practically absent in birds of prey and fish-eating species whose food is soft. All birds with well developed gizzards swallow small particles of gravel, sand, etc., which by the action of the muscular walls grind up the food that they have swallowed and render it suitable for digestion, performing, as it were, the work of the molars or grinding teeth of mammals.

The complicated voice-organ or syrinx, comprising the lower portion of the larynx, is another organ peculiar to birds, and the arrangement and number of the muscles that contract the horny rings by which the vocal chords are controlled, have recently been found to be of fundamental importance in avian classification. This organ is only highly developed in the singing-birds (*Oscines*).

Classification.— Owing to the great amount of attention that has been devoted to systematic ornithology through long periods of years, we find that it is through this branch also that the "science" of nomenclature has reached its present formidable development. Although of equal importance to all systematists, it is the ornithologists who have been responsible for the earlier and the more important codes that have been formulated to govern the formation and adoption of our technical systematic names. From the time of Aristotle scientific literature has been full of attempts to classify birds. The earlier schemes naturally dealt with external characters only, and as feathers were common to all, the only available parts were the bill and feet. There were two grand divisions, Water Birds and Land Birds, while under these came the waders, swimmers, divers, etc.; the birds of prey, gallinaceous birds, *Fissirostres, Conirostres, Tenuirostres,* etc.

In 1813 Merrem proposed to separate the birds with a smooth breast-bone (ostriches, etc.) from the rest of the class — which all possess a keel on the sternum. This was an important advance, and the first recognition of the modern groups *Ratitæ* and *Carinatæ*. In 1827 a Frenchman, L'Herminier, made an extended study of the skeletal structure of birds and brought to light many points of relationship between birds hitherto regarded as distinct and *vice versa*. The cranes and herons were shown to be wrongly associated, and similarly the gulls and petrels, while the relationship between the gulls and the plover tribe was pointed out. Thus were the long accepted groups of "waders" and "swimmers" rudely shattered and the external resemblance in foot-structure was shown to be superficial.

The classification of birds, always a puzzle, now became still more complex, and all parts of the avian structure were investigated in the hope of reaching some set of characters that would prove the solution of the problem. The idea seemed to be then prevalent — and is still so in the minds of some systematists — that some one part of the bird's structure would furnish characters upon which a satisfactory classification could be established. Nitzsch made numerous anatomical investigations, but his most important discoveries were in connection with pterylography, showing that the number and shape of the feather-tracts differed widely in different groups. McGillivray and Müller studied the soft anatomy, and the latter was the first to divide the passerine birds into *Oscines* (singing birds) and *Clamatores*, by pointing out the difference in the number and character of the vocal muscles. Sundevall considered the physiological side of the subject and was the first to define Altricial and Precocial birds — those respectively that are hatched helpless and reared in a nest and those that run about as soon as leaving the egg. Up to this time classification meant a search for similarities with the object of arranging species in definite groups and families. In the minds of some the whole matter was one of mathematical exactness and in this connection the circular system outlined by Swainson in his 'Geography and Classification of Animals' is interesting reading. There now came a revolution in the classification of birds, as well as of other groups. In 1859 Darwin published his 'Origin of Species,' and his work, as well as that of Alfred Russel Wallace, soon put classification in a new light. It was realized that the birds of to-day are the terminal branches of a great family tree of bird-life whose trunk and early limbs are far back in the geological past, where they merged into the trunk which has produced the modern reptiles. Some of our present bird-families, notably those most numerous in species, are comparatively recent developments, suited in every way to prevailing conditions; while others, usually with few representatives, are the remnants of ancient groups which belong much farther back on the tree, and have barely survived to the present time. The significance of fossil-forms now became evident, as well as the fact that birds could not be arranged in a lineal series and preserve their proper relationship. It was also clear that in tracing the phylogeny of birds all sorts of characters must be taken into consideration; since modification in one part may have been important at one time, or in one group, while in another group some other part was the seat of variation.

The principal contributors to the modern classification of birds are as follows:

Huxley in 1867 made a study of birds' skulls and demonstrated the importance of the arrangement of the bones of the palate as an aid to classification, defining the several types of palate-structure known as dromæognathous, desmognathous, schizognathous and ægithognathous.

Garrod and Forbes made important additions to our knowledge of the muscular anatomy of birds, and in 1888 Fürbringer published probably the greatest treatise on avian phylogeny that has yet appeared. One of his most important discoveries was that of the descent of the ostriches and their allies from flying ancestors, showing them to be a degenerate and not a primitive group.

In spite of the vast amount of attention that has been given to the subject, we are still far from solving the problem of avian classification. The great rarity of fossil birds leaves gaps in the system which it is almost hopeless to expect to fill; and although ornithologists are pretty well agreed upon a number of the leading groups, their exact phylogeny will remain a matter of guesswork unless comparative embryology shall solve the problem. It is a well-known fact in zoology that the embryonic development of the individual in the main represents the palæontological development of the species; and if embryo birds had been saved and studied by oologists, instead of the empty shells of the eggs, we might to-day be much farther along on our way.

The present views of bird-classification are briefly as follows: We have two distinct branches of existing birds, the degenerate *Ratitæ* and the *Carinatæ*. The former represented by four orders: 1, the Apteryxes of New Zealand; 2, the cassowaries and emus of the Australian region; 3, the rheas of South America; and 4, the ostriches of Africa and Arabia.

Among the *Carinatæ* we have, first of all, the tinamous (*Crypturi*), a sharply defined group of birds recalling the gallinaceous type in external appearance, but with many points of resemblance to the *Ratitæ*. The penguins (*Sphenisci*) are a degenerate group of somewhat doubtful affinity, which Dr. Stejneger regards as differing more from any of the remaining birds than they do from each other; while other authorities place them as a distinct order, but in alliance with the loons. The latter, together with the grebes, form a natural order *Pygopodes*, while the petrels and albatrosses form another, *Tubinares*. The relationship of the auks (*Alcidæ*) has been in some doubt, but they are now most frequently placed near the gulls (*Gaviæ*). The latter have much in common with the plover and sandpipers (*Limicolæ*), and the sheathbill (*Chionis*) is in many respects intermediate; together with the bustard (*Otididæ*) they seem to form another natural order. Three other groups of "water" birds constitute well defined groups: (1) The *Anseriformes*, ducks and geese, with the outlying horned screamers (*Palamedea*) and flamingos; (2) the storks and herons; and (3) the *Steganopodes*, or toti palmate swimmers; that is, cormorants, pelicans, etc. The last-named bear affinity to the hawk-tribe (*Accipitres*), which, with the American vultures, form a distinct group, their only other alliance being a possible one with the herons through the secretary bird (*Serpentaria*). We have left the cranes (*Gruidæ*), rails (*Rallidæ*), and trumpeters (*Psophiidæ*), which form an order *Gruiformes;* and several very puzzling forms which are generally placed in the neighborhood of the rails, though they have no near relatives, and some, at least, are generalized forms descended from earlier branches of the family tree and consequently exhibiting characters possessed by several distinct modern families. Such birds are the seriema, sun-bittern and kagu.

We next have the great gallinaceous assemblage, near which are placed the sand-grouse (*Pterocles*) and the pigeons (*Columbæ*). While that curious bird, the hoactzin, the representative of a distinct order, seems in some respects a connecting link between the gallinaceous type and the plantain-eaters (*Musophagidæ*), which stand near the cuckoos. From this point we pass to a number of groups, some of them very sharply defined, others less so; as, for instance, the woodpeckers (*Pici*), parrots (*Psittaci*), owls (*Striges*), whip-poor-wills, etc. (*Caprimulgi*), swifts (*Cypseli*), humming-birds (*Trochili*), etc. The complete separation of the owls from the hawks seems borne out by all modern researches, and their true position is probably in the neighborhood of the *Caprimulgi*. Last of all come the *Passeres*, divisible into two suborders and comprising far more species than all the other orders combined, but so hopelessly are the species interrelated that only a very few clearly circumscribed families can be distinguished, of which the swallows (*Hirundinidæ*) are one of the best. Just which species of passerine birds are the highest; that is, the most specialized, is a matter concerning which there is much difference of opinion, and the thrushes, crows and finches have each been awarded the honor.

The following scheme, slightly modified from that of Dr. H. Gadow, will show approximately the present ideas of classification. Phylogenetically we may regard the *Colymbomorphæ* and *Pelagomorphæ* as branches of one stock, while the *Alectromorphæ* came away independently. The *Coraciimorphæ* have branched off from the last named, the hoactzin and the plaintain-eaters representing one point of alliance. The *Ratitæ*, on the other hand, are a degenerate group probably from the same ancestry as the tinamous.

RATITÆ.

The Ostrich tribe and certain Fossil allies.

CARINATÆ.

Colymbomorphæ:

I. Spheniscifórmes,— Penguins.

II. Colymbiformes,— Grebes and loons.

III. Procellariiformes,— Petrels and albatrosses.

Pelagomorphæ:

I. Ciconiiformes,— 1, Cormorants, etc.; 2 herons; 3, storks.

II. Anseriformes,— 1, Palamedea; 2, ducks and geese; 3, flamingos.

III. Falconiformes,— 1, Cathartæ; 2, hawks, etc.

Alectromorphæ:

I. Tinamiformes,— Tinamous.

II. Galliformes,— 1, Hemipods; 2, gallinæ; 3, hoactzin; 4, sand grouse; 5, pigeons.

III. Gruiformes,— 1, Sun-bitterns; 2, rails; 3, cranes; 4, trumpeters; 5, seriema.

IV. Charadriiformes,— 1, plovers, etc.; 2, gulls and auks.

Coraciimorphæ:

I. Cuculiformes,— 1, cuckoos, etc.; 2, parrots.

II. Coraciiformes,— 1 Coraciæ; 2, owls; 3, caprimulgi; 4, swifts; 5, colies; 6, trogous; 7, woodpeckers.

III. Passeriformes,— 1, Eurylæmidæ; 2, clamatores; 3, menuridæ; 4, oscines.

The number of species of birds is enormous, and a very large portion of ornithological literature has to do with their description, a work which is still progressing; for though it is probable that nearly all the distinct forms of bird-life have been discovered and described, there is still an abundance of closely allied geographic races to be distinguished. This refinement in separation of species and "varieties" in ornithology early reached a point far in advance of that attained in any other group of vertebrates, and the effects of peculiar environment and isolation in the evolution of species was apparently first clearly recognized from the study of birds. In some countries, notably in North America, the birds have been so closely examined over large areas that it is possible to trace the exact effect of peculiar climatic conditions upon color, and parallel examples are furnished by several different types of birds. The recognition of large numbers of closely allied geographic races, while deplored by those who would keep our nomenclature within the limits of convenience, is of the greatest importance in broader scientific research. Not only are valuable data thus obtained for the study of the evolution of species in its relation to geographic distribution and environment, but by recognizing certain peculiarities, however slight, as characteristic of birds breeding in a certain district, it is possible to identify the same form in its winter quarters or *en route;* and already data are being collected in the United States which before long will throw much light upon the exact course of the migration. The recognition of these geographic races in ornithological nomenclature resulted in the adoption by many ornithologists, notably Americans, of a trinomial system instead of the binomial system of Linnæus, and geographic forms are now denoted by a "subspecific" name attached to the generic and specific ones, as, for example, *Melospiza melodia fallax.* This very materially alters our old conception of a species, just as the theory of evolution modified the conception of orders and families, and we are now coming to recognize that species and subspecies (they differ only in degree) as we find them to-day are forms differentiated from one another in variable degree, some perfectly distinct, others so slightly as barely to be appreciable. The attempt to denote the degree of variation by any system of names is bound to express merely individual opinion, and this explains much of the constant controversy over nomenclature.

The beauty of birds has appealed to the artistic side of many men, and many early ornithologists were artists and regarded the colored plates in their books as of perhaps more importance than the text. As examples of ornithological works of this sort may be mentioned Catesby's 'Natural History of Carolina,' Wilson's 'American Ornithology,' and Bonaparte's supplement to it; the elephant folios of Audubon, and the many sumptuous works of John Gould. Of recent years the perfection of photographic apparatus has made possible the photography of living birds in all the functions of life, which has proved of great scientific value. By thus bringing together accurate pictures portraying widely scattered species we have material from which valuable deductions are likely to be made.

Bibliography.— General works are Gadow, Brehm's 'Thierreich' (Vögel); Newton, 'Dictionary of Birds'; British Museum, 'Catalogue of Birds'; Coues, 'Key to North American Birds'; and Cassells, the Royal, the Standard and the Cambridge 'Natural Histories,' especially Evans, 'Birds' (1900), in the last named series. Newton's 'Dictionary' (1896) contains an immense bibliography relating to systematic and faunistic ornithology. For the United States the early standard works were the 'Ornithologies' of Audubon, Wilson and Nuttall. The publication by Spencer F. Baird (1859) of the 8th volume of the 'Pacific Railway Reports,' dealing with the birds of the country in accordance with advanced knowledge, started a new epoch in the study. This was stimulated again by the publication, first in 1872, of Elliott Coues' 'Key to North American Birds,' which has since passed through many editions. The most important and latest manual is Robert Ridgway's 'Birds of North and Middle America,' begun in 1901.

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Ornithop'oda, a group of dinosaurs, now included in the *Orthopoda* (q.v.).

Or"nithoryn'chus. See DUCKBILL.

Or"nithosau'ria, the pterodactyls. See PTEROSAURIA.

Or"nithoscel'ida, a group named by Huxley to include certain genera of dinosaurs (*Iguanodon, Megalosaurus,* etc.), which "present a large series of modifications intermediate in structure between reptiles and birds."

Ornithos'toma, the generic name of a huge pterodactyl from the Cretaceous rocks of Kansas, which is probably identical with *Pteranodon.* See PTERODACTYLS.

Or"obancha'ceæ, the broom-rape family. The general properties of this family of plants are astringency and bitterness. The calyx is divided, persistent, inferior; the corolla hypogynous, irregular, persistent, æstivation imbricated; stamens, four; ovary free, one-celled, with two carpels; style, one; stigma two-lobed, divided transversely to the carpels; fruit capsular. The *Orobanchaceæ* are herbaceous parasites, with scales in place of leaves. They attach themselves to the roots of different plants, and have received the name of broom-rapes from the ravages they are supposed to commit among plants of the broom family. The different species attach themselves to different plants, as the *Orobanche major* to broom and furze, *O. ramosa* to hemp, *O. rubra* to thyme, *O. hederæ* to ivy. The central cellular portion of the stems is surrounded by fibro-vascular bundles, which connect themselves with those of the plants to which they attach themselves. They have also tubers and ordinary roots, from which it is supposed they may derive nourishment from the soil. See CANCER-ROOT; BROOM-RAPE.

Or'obus. See BITTER VETCH.

Org'raphy, a term applied to the study of mountains, their chain, branches, etc. The study includes the method of measuring the heights of mountains by trigonometrical survey. The great difficulty to be encountered in this method of measurement arises from the optical delusion occasioned by the different states of

the density of the atmosphere, causing a proportionate change of refraction, which may, however, be corrected by hygrometric observation. In modern times it has been usual to ascertain the heights of mountains by barometrical observation, as being much more convenient and sufficiently correct for all practical purposes. There is a proportionate relation between the height of the mercury in the barometer and the altitude of the point of observation, which may guide in ascertaining within certain limits the acclivities and declivities of any line of travel, so that by observing the rises and falls in the barometer, and noting the distances, an outline may be obtained of the profile of the tract.

Orohip'pus. See HORSE, EVOLUTION OF.

Orono, ō'rō-nō, Maine, town, Penobscot County; on the Penobscot River, and the Maine Central railroad, 7 miles northeast of Bangor. It was settled in 1774, and became a town in 1806. Its chief industry is the manufacture of lumber, and it contains a number of lumber mills, also pulp and paper mills. It is the seat of the University of Maine, including the agricultural college and the experiment station. Pop. (1900) 3,257.

Orontes, ō-rŏn'tēz, Syria, the classic name for the modern AASI, or Nahr-el-Asi, a river rising on the east of the Anti-Libanus, in a natural basin of rock, the site being marked by an ancient monument. It flows north through the plain of Hamah to the Lake of Antioch, and thence southwest into the Mediterranean. Its entire course is about 200 miles.

Orosius, ō-rō'sĭ-ŭs, **Paulus,** Latin historian and theologian: b. Tarragona, Spain, about 390 A.D. He became a Christian presbyter, resided a considerable time with Saint Augustine at Hippo, and wrote at his suggestion a general history of the world, 'Adversus Paganos Historiarum Libri VII.,' to prove that the Christians were not to blame for the downfall of the Roman empire as the heathen alleged. He tries to picture the wretchedness and evils of the heathen period in as dark colors as possible, making use of the works of Livy, Tacitus, Suetonius, and other Roman writers. His history, however, is regarded by scholars as being of little value, though it long enjoyed a great popularity, and was translated into Anglo-Saxon by Alfred the Great with modifications and additions. Orosius is also said to have written a work on the errors of Priscillian and Origen, and still other writings are attributed to him. His history has been edited by Zangemeister (1882), and several English translations and editions of Alfred's translation have been published.

Orotava, ō-rō-tä'vä, Canary Islands, a town in the northwest of the island of Tenerife, formerly the capital and court of the principal kingdom of the Guanches. It is regularly built, and among its buildings are a beautiful church with three naves, and an English church. In a valley east of the town is a botanic garden. Orotava is a summer resort much frequented by European health seekers. It has an export trade in wine and cochineal. Pop. (1900) 9,000.

Orozco y Berra, ō-rōs'kō ē bĕr'rä, **Manuel,** Mexican historian: b. City of Mexico 8 June 1816; d. there 27 Jan. 1881. He studied both law and engineering and became editor of 'El Parvenir' in 1846, and in 1852 was appointed director of archives. Among his published works are: 'Geografia de las lenguas y carta etnográfica de México' (1864); and 'Historia de México,' his most famous work (1880–1).

Orphan Asylums, Orphanages, and **Homes for Orphans,** are the terms variously applied to establishments in which orphans who have not relations able to support them are provided for and educated. The care which society at large is bound to take of destitute orphans is in many countries considered as an important point of political economy. The question of most consequence in relation to the public support of orphans, is, whether it is best, in a moral, physical, and economical point of view, to bring up large numbers of orphans in great establishments, where they live together; or to put them out singly in trustworthy families, paid by the community. In Germany this question has been long and thoroughly discussed; and it appears that the majority of persons in that country conversant with the subject prefer the plan of bringing them up in separate families. This plan has also been tried with success in Switzerland. Both systems have their inconveniences and advantages. It would appear to be cheaper, as well as better for the morals of orphans, to educate them in separate families; and in the way in which asylums have been generally conducted on the continent of Europe, the health of the children has appeared not to be so well taken care of as in families. Some asylums, however, form brilliant exceptions, as the great asylum at Potsdam, near Berlin.

History.— The history of the origin of orphan asylums is uncertain. What the Romans understood by *pueri et puellæ alimentarii* cannot properly be compared to our publicly supported orphans. Trajan did much in favor of orphans, and both the Antonines and Alexander Severus established foundations for them; but such institutions do not seem to have become frequent till the introduction of the Christian religion. In the Middle Ages, however, in which so many institutions beneficial to mankind originated within the walls of thriving and opulent cities, orphan asylums became frequent in such places, particularly in the larger commercial towns of the Netherlands. In Germany the first asylums are found in the free cities, yet their origin does not extend before the 16th century. One of the most famous asylums in the world is that established by A. H. Francke at Halle in 1698. There are also some considerable orphanages in Italy, and in France they are very numerous. In Great Britain there are few asylums exclusively appropriated to orphans, these being generally disposed of in poor-houses, etc.

United States.— In this country the orphan asylums are in the main supported as private institutions, assisted by legislative appropriation. They are fostered also by the religious denominations in almost every State. In many individual counties throughout the Union, county asylums have in late years been established. In the South there are several colored orphanages, and in New York State there is the Thomas Asylum for Orphan and Destitute Iroquois Indian Children, established on the Cattaraugus Reservation in Erie County. The care of orphans by the State had its origin in Michigan in 1871,

when the State Public School for Dependent Children was established. Since then one fourth of the States and Territories have followed Michigan's example. Following is a list of the State orphanages thus established:

State	Year Established	State	Year Established
Michigan	1871	Texas	1887
Nevada	1873	Kansas	1889
Iowa	1876	Montana	1893
Rhode Island	1884	Colorado	1895
Minnesota	1885	Nebraska	1898
Wisconsin	1886	Alabama	1899

The various States and Territories care for the orphaned children, according to the reports obtained in 1902 by the National Association of Charities and Correction, as follows:

Alaska.— In the care of destitute orphan children in the territory nothing has been done by the government, but various religious denominations have established homes where native orphan children are taken, fed, clothed, taught, trained, and cared for.

Colorado.— The government supports a State Home for Dependent and Neglected Children at Denver to which children are committed under the law, and from whence they are placed in private families under State supervision. In 1901 there was established the Cherry-tree Home Orphanage, at the Salvation Army farm in Prowers County; and the Sacred Heart Orphanage by the Sisters of Saint Francis at Pueblo.

Connecticut.— A temporary home is provided in each of eight counties for the care of dependent and neglected children, until suitable family homes can be found for them. There were 716 of such children in 1902. Private asylums and orphan homes cared for 1,200 children during the same year.

Delaware.— In this State the institutions include the Home for Friendless Children; Saint Peter's Female Orphanage and Saint James Protectory.

District of Columbia.— A Board of Children's Guardians in the District care for 665 children annually.

Illinois.— There is here a Home for Soldiers' Orphans. In Chicago there are several orphanages with 4,000 inmates; the city, however, has long been committed to the policy of placing neglected children in family homes in preference to bringing them up in an institution.

Indiana.— The State has a Soldiers' and Sailors' Orphans' Home, numerous private orphan asylums, and there are Boards of Children's Guardians in seven counties. In 1902 there were about 1,800 orphans in the various State institutions.

Iowa.— In several counties there are homes for orphans and the State controls the Iowa Soldiers' Orphans' Home at Davenport.

Louisiana.— The sectarian orphan asylums in this State cared for 2,037 children in 1902.

Maine.— There is a Temporary Home for Children in Portland, and a fast growing tendency is manifest in this State to care for orphans outside of the poor-houses, where they have been heretofore received.

Massachusetts.— In 1902, there were 3,500 destitute children cared for, two thirds of whom were placed in private families.

Michigan.— There is a State Public School at Coldwater for dependent children, the first State home of this kind established in the United States. Since 1874 over 5,000 children from this institution have been placed in homes. Several private orphan asylums in the State care for upward of 1,000 children.

Minnesota.— There is a State Public School in this State which cares for 220 children annually and about 750 are housed in orphan asylums.

Mississippi.— There are six orphanages in this State, each in charge of a religious denomination. The Natchez Presbyterian Orphan Asylum was established in 1880. There is a Baptist orphanage at Jackson and a Waifs' Home near Biloxi.

Montana.— The State supports an orphans' home at Twin Bridges.

Nebraska.— There is a Home for the Friendless at Lincoln and a Christian Home for Children at Holdredge. The Lutherans support the Tabitha Home at Lincoln and the Episcopalian Church has a home at York. The Saint James Orphanage is located at Omaha.

Nevada.— The government supports a State Orphans' Home at Carson City, which was established in 1873.

New Hampshire.— The law provides for the removal of orphans from county almshouses within 60 days after their admission. They are mostly placed in private families.

New York.— There are numerous public and private orphanages in New York State, and over 40,000 children are housed in such institutions. The asylums and homes number perhaps 100, all of which are under State supervision and many of them are partially supported by legislative appropriations.

North Carolina.— The Orphan Asylum at Oxford has 220 inmates, and the Colored Orphan Asylum in Granville County 110 inmates. Buncombe County has a Home for Orphans supported by county funds.

Rhode Island.— The State Home and School for Destitute Children cares for 200 children annually. It is located at Providence.

Texas.— The State Orphans' Home was established at Corsicana in 1887.

Wisconsin.—A State Public School is maintained at Sparta with 200 inmates.

Porto Rico.— The island colony has a Boys' Charity School with 300 pupils and a Girls' Charity School with 200 pupils.

State Laws.— The law in New York State providing for the care of orphan children may be cited as what is generally the enactment in most of the States. The law provides

1. The guardianship of the person and the custody of any indigent child may be committed to any incorporated orphan asylum or other institution incorporated for the care of orphan, friendless, or destitute children, by an instrument in writing signed by the parents of such child, if both such parents shall then be living, or by the surviving parent, if either parent of such child be dead, or if either one of such parents shall have, for the period of six months then next preceding, abandoned such child, by the other of such parents, or if the father of such child shall have neglected to provide for his family during the six months then next preceding, or if such child be a bastard, by the mother of such child; or if both parents of such child shall then be dead, by the guardian of the person of such child, legally appointed, with the approval

of the court or officer which appointed such guardian to be entered of record; or if both parents of such child shall then be dead and no legal guardian of the person of such child shall have been appointed, and no guardian of such child shall have been appointed by a last will and testament, or by a deed by either parent thereof, or if the parents of such child shall have abandoned such child for the period of six months then next preceding, by the mayor of the city or by the county judge of the county in which such asylum or such other institution shall be located, upon such terms, for such time, and subject to such conditions as may be agreed upon by the parties to such written instrument. And such written instrument may provide for the absolute surrender of such child to such corporation. But no such corporation shall draw or receive money from public funds for the support of any such child committed under the provision of this section, unless it shall have been determined by a court of competent jurisdiction that such child has no relative, parent, or guardian living, or that such relative, parent, or guardian, if living, is destitute and actually unable to contribute to the support of such child.

2. It shall not be lawful for any county superintendent or overseer of the poor, board of charity, or other officer, to send any child between the ages of 2 and 16 years, as a pauper, to any county poor-house or alms-house for support and care, or to detain any child between the ages of 2 and 16 years in such poor-house or alms-house; but such county superintendents, overseers of the poor, boards of charities, or other officers shall provide for such child or children, in families, orphan asylums, hospitals, or other appropriate institutions, as provided by law. The boards of supervisors of the several counties of the State are directed to take such action in the matter as may be necessary to carry out the provisions of this section. When any such child shall be so provided for or placed in any orphan asylum or such other institution, such child shall, when practicable, be so provided for or placed in such asylum or such institution as shall then be controlled by persons of the same religious faith as the parents of such child.

3. All institutions, public or private, incorporated or not incorporated, for the reception of minors, whether as orphan or as pauper, indigent, destitute, vagrant, disorderly, or delinquent persons, are required to provide and keep a record in which shall be entered the date of reception, and the names and places of birth and residence, as nearly as the same can reasonably be ascertained, of all children admitted in such institutions, and how and by whom and for what cause such children shall be placed therein, and the names, residence, birthplace, and religious denomination of the parents of such children so admitted, as nearly as the same can be reasonably ascertained; and whenever any such child shall leave such institution, the proper entry shall be made in such record, showing in what manner such child shall have been disposed of, and if apprenticed to or adopted by any person or family, or otherwise placed out at service or on trial, the name and place of residence of the person or head of the family to or with whom such child shall have been so apprenticed, adopted, or otherwise placed out. The Supreme Court may, upon application by a parent, relative, or legal guardian of such child, after due notice to the institution and hearing had thereon, by order direct the officers of such institution to furnish such parent, relative, or legal guardian with such extracts from such record relating to such child as such court may deem proper.

4. While any child which shall have been placed in such asylum, or other institution, as a pauper, in pursuance of the second section of this act, shall remain therein at the expense of the county or town to which such pauper child is chargeable, the superintendents of the poor of such county, or the overseer of the poor of such town, may, in their discretion, remove such child from such asylum or other institution and place such child in some other such institution or make such other disposition of such child as shall then be provided by law. The name of no child shall be changed while in such institution as in this section aforesaid. But no parent of such pauper child, so in such asylum or other institution as in this section aforesaid, shall be entitled to the custody thereof except in pursuance of a judgment or order of a court or judicial officer of competent jurisdiction, adjudging or determining that the interests of such child will be promoted thereby, and that such parent is fit, competent, and able to duly maintain, support, and educate such child.

5. Any corporation specified in the first section of this act may bind out any indigent or pauper child, if a male, for a period which shall not be beyond his 21st year, and if a female, for a period which shall not be beyond her 18th year, which shall have been absolutely surrendered to the care and custody of such corporation in pursuance of the provisions of the first section of this act, or which shall have been placed therein as a pauper in pursuance of the provisions of the second section of this act, or which shall have been left to the care of such corporation with no provision by the parent, relative, or legal guardian of such child, for its support for a period of one year then next preceding, to be a clerk, apprentice, or servant.

6. Any child which a corporation specified in the first section of this act is, by the fifth section of this act, authorized to bind out, may be placed by such corporation, by adoption. See FOUNDLING.

Consult Annual Reports, 'Conference of Charities and Correction.'

WILL M. CLEMENS,
Editorial Staff, 'Encyclopedia Americana.'

Orphans. See HUSSITES.

Orphans' Court, in Pennsylvania and a few other States, a court similar to that of the surrogate; devoted largely to probate matters, such as the granting of letters of administration; to take proof of wills and to direct and control estates and the settlement of accounts of executors and administrators. See also COURT.

Orpheus, ôr'fūs, in Greek mythology, an important personage, surrounded by a multitude of legends, which invariably associate him with Apollo and the Muses. To him is attributed the application of music to the worship of the gods. Apollo presented him with his lyre, and the Muses instructed him to use it, so that he

moved not the beasts only, but the woods and rocks with its melody. Having lost his wife Eurydice by the bite of a serpent he descended to Hades to try and get her back. His music so moved the infernal deities Pluto and Proserpine that they consented to her return to earth, only her husband, whom she was to follow, must not look back till they had reached the upper world. This condition the impatient Orpheus violated and lost his wife forever. He is said to have met his death at the hands of a band of furious women engaged in the mystic rites of Bacchus. He is represented as one of the Argonauts, and to him is ascribed the origin of the so-called Orphic mysteries connected with the worship of Bacchus. The bulk of the poems attributed to Orpheus in modern times have been proved to be forgeries of Christian grammarians of the Alexandrian school. A portion of them, however, belong to the time of Onomacritus, or earlier, and include hymns, a theogony, a poem called 'Minyas, or the Descent Into Hades'; oracles and songs for initiation, and sacred legends. Among those who have investigated the Orphic writings are Ottfried Müller, Grote, and Lobeck. See also APOLLO; BACCHUS; EURYDICE; MUSES.

Orpheus C. Kerr, the pseudonym of ROBERT HENRY NEWELL (q.v.).

Or'piment, the native mineral, yellow sulphide of arsenic, As_2S_3. It forms rhombic trimetric prisms of translucent lemon-yellow color. Its specific gravity is 3.45. It is very poisonous. It was formerly used as a pigment and was known as king's yellow.

Orpine, or **Live-forever,** a perennial herb (*Sedum telephium*) of the natural order *Crassulaceæ*. It is a native of Europe and northern Asia, whence it has been introduced in cool climates throughout the civilized world. In the United States and Canada it is of frequent occurrence among rocks and in sandy, dry and poor soils, often being the only herbage in such places. Though it produces few blossoms it spreads rapidly by means of its roots. Thrifty specimens attain heights of 15 to 18 inches, bear obtuse, heart-shaped toothed, fleshy leaves, and pink or sometimes white flowers in dense rounded cymes, both terminal and lateral. Several horticultural varieties are used in rock-gardens and places where little attention is required or can be given.

Orr, ôr, **Hugh,** American inventor: b. Lochwinoch, Renfrewshire, Scotland, 13 Jan. 1717; d. Bridgewater, Mass., 6 Dec. 1798. He came to America in 1737 and settled at Bridgewater, where he began work as a gunsmith and manufactured edged tools. In 1753 he invented a machine for dressing flax, and his other inventions were many. He was an ardent patriot in the Revolutionary War, and erected a foundry where he cast cannon and shot for the army.

Orr, James, Scottish theologian: b. Glasgow 11 April 1844. He was educated at Glasgow University and the Theological Hall of the United Presbyterian Church. He entered the ministry and was pastor of East Bank United Presbyterian Church, Hawick 1874–91; in 1895 lectured in Chicago on German theology, and in 1897 lectured on the Elliot and Morgan foundations at Allegheny, Pa., and Auburn, N. Y. He was also professor of church history in the United Presbyterian Theological College, Scotland, 1891–1901. He has published: 'The Pulpit Commentary' (1891); 'The Christian View of God and the World' (1893); 'The Supernatural in Christianity' (1894); 'Early Church History and Literature' (1901); 'The Progress of Dogma' (1902); etc.

Orr, James Lawrence, American legislator: b. Claytonville, S. C., 12 May 1822; d. Saint Petersburg, Russia, 5 May 1873. He was graduated from the University of Virginia in 1842, admitted to the bar in 1843, and established a law practice in Anderson, S. C., also editing the Anderson 'Gazette.' He was elected to the State legislature in 1842, served two terms, and in 1848–59 was a member of Congress, officiating as speaker of the House in the 33d Congress. A strong opponent of secession, he opposed it as long as possible, and then followed the lead of his native State. He commanded one of the first Confederate regiments raised in South Carolina, but in 1862 entered the Confederate senate, of which he was a member until the close of the war. He was the first governor of South Carolina after the restoration of her rights as a State of the Union, serving from 1866–8, and in 1872 was appointed minister to Russia, where he died in the following year.

Orrery, ôr'ē-rĭ, **Earls of.** See BOYLE.

Orrery, in astronomy, a machine for representing the motions of the planetary bodies. Distinct names have been given to various modifications of it: the planetarium, which exhibits the orbital paths of the planets and their satellites; the tellurium, which shows the motions of the earth causing day and night, the seasons, and the variable length of the former as dependent upon the latter; the lunarium, which shows the motions of the moon; and the satellite machine, chiefly intended to represent the motions of Jupiter and his satellites. The ordinary orrery was invented by George Graham about 1700, and first patronized by the Earl of Orrery. Steele, probably supposing the earl to be the first promoter if not the inventor of it, called it by his name. The contrivance is useful rather in aiding the conceptions than in elucidating truths; but it is mischievously faulty owing to the impracticability of representing in model anything like the proportions subsisting among the planetary bodies.

Orris Root, the rhizome or underground stem of a white flowering species of iris, the *I. Florentina,* a native of the south of Europe. In a dried state it is well known on account of its communicating a grateful odor, resembling that of violets. It was formerly much employed in medicine, but is now little valued except as a perfume. It is exported from the Mediterranean in considerable quantities, and, among other uses, is employed in the manufacture of tooth powder. Compare IRIS.

Orsini, ôr-sē'nē, Italian noble family dating back to the 10th century. In the 11th century the Piedmont branch were prominent among the members of the Guelph party, even opposing Frederick Barbarossa. But the Roman branch is better known, especially for its rivalry with the Colonna family, beginning at the close of the 13th century; the first great name in this

branch is Nicholas III., who was pope from 1277 to 1280. Even in the city of Rome the Orsini built strong fortresses, thanks to the connivance of Eugene IV., one of them covering the site of the Marcellus Theatre. They boldly opposed the attempt of Henry IV. to assert his power in Rome, and the most notable part of their struggle with the Ghibelline Colonnas was the mad and unrestrained fighting of 1333–5, which by its abuses paved the way for the brief Roman republic under Cola da Rienzi. The important members of the next centuries were: VIRGINIO: d. 18 Jan. 1497, a famous condottiere, who fought for the pope, then for the king of Naples, and finally for Charles VIII.; NICCOLO, count of Petigliano: b. 1442; d. 1510; head of the Angevin party, and later leader of the Venetians against the League of Cambrai; VINCENZO MARIA, who became Pope Benedict XIII. (q.v.) in 1724; and FULVIO ORSINI (1529–1600), an antiquarian and author of 'Familiæ Romanæ' (1577).

Orsini, Felice, fā-lē'chā, Italian revolutionist: b. Meldola December 1819; d. Paris 13 March 1858. He studied at Imola and Boulogne, took part in several plots against the pontifical government, was condemned to the galleys for life at 25, was pardoned by Pius IX., became a leader of the rising of 1848, and after the fall of the republic engaged in several unsuccessful plots. He was arrested and imprisoned in 1855, escaped to England, where he made a living as a lecturer on the papacy, and as the author of 'Austrian Dungeons in Italy' and 'Memoirs and Adventures' (1857). Hoping that the death of Napoleon III. would be followed by a general Italian rising, he made his way to Paris in December 1857, and 14 Jan. 1858, with his two accomplices, threw three bombs at the emperor and empress in the Opéra. Many were killed by the explosions, but Napoleon and Eugenie were unhurt. Orsini was executed with one of his accomplices, the other being pardoned at the empress' request.

Orsova, ōr'shō-vō, Hungary, a frontier town on both banks of the Cerna at its confluence with the Danube, near the Vaskapu or Iron Gates, 92 miles east of Belgrade. OLD ORSOVA, the Roman Tierna, on the west bank of the Cerna, has a modern harbor, is a station for the Danube steamers, and an important railway junction. Pop. (1900) 4,610. NEW ORSOVA (pop. about 3,500), on the Rumanian side, is a fortified town held by Austria since 1878, who also were masters of it between 1716 and 1738; the Turks held it both before 1716 and after 1738. In 1890–6 a costly canal and other works were made for facilitating navigation at the rocky bend called the Iron Gates.

Ortegal, Cape. See CAPE ORTEGAL.

Orth, ôrth, **Bertrand,** Canadian Roman Catholic prelate: b. Rhine Province, Prussia, 5 Dec. 1848. He received a theological education at the American College in Louvain, Belgium, and was ordained in 1872, when he was sent to Oregon as missionary to the Indians. He remained in that position until 1890, when he was appointed United States post chaplain at Camp Harney. In addition to his missionary work he has edited the 'Catholic Sentinel' of Portland and taught in various Catholic colleges. In 1900 he was consecrated bishop of Vancouver Island, and in 1903 was elevated to the archbishopric.

Orth, Godlove Stoner, American legislator: b. near Lebanon, Pa., 22 April 1817; d. Lafayette, Ind., 16 Dec. 1882. He was graduated from the Pennsylvania College at Gettysburg, admitted to the bar in 1839, and began his law practice in Lafayette, Ind., where he at once interested himself in politics. In 1843–50 he was a member of the State senate, and in 1861 was appointed one of the five commissioners to consider the possibilities of a peaceful solution of the impending troubles. His sympathies were on the Union side, and after a brief term of military service he was elected to Congress in 1862–6; he supported the policy of President Lincoln, was re-elected to the 43d, 45th, and 47th Congresses, and in 1875 was appointed minister to Vienna.

Or'this, a large genus of palæozoic brachiopods, typical of the strophomenaceous family *Orthidæ,* which lived in such abundance and variety from the Ordovician to the Carboniferous periods that they are known from all over the world and the Ordovician and Silurian formations alone have yielded no less than 400 species. American specialists, it should be said, subdivide the genus into a dozen or more subgenera. The orthids have a shell, squarish in outline, with the surface covered with radiating striæ or costæ. The valves more or less convex; the small or dorsal valves, sometimes nearly flat or slightly concave. A distinguishing feature of the genus is that the well-developed hinged area is usually divided by a large open delthyria. A deltidium is developed only in younger growth stages. Consult: Zittel-Eastman, 'Text-book of Palæontology' (1900).

Or'thite, natural hydrated silicate of aluminum, with long, straight prismatic crystals (hence its name), which occur in feldspar. Its specific gravity is between 3.37 and 3.8, its hardness between 5 and 6. Orthite occurs in granite, gneiss, syenite, and other rocks; usually is of a brownish or yellowish color, and contains many rare elements, such as cerium, lanthanum, yttrium, and didymium. It is found in the Urals and in Sweden, Norway, and Greenland.

Orthoceras, ôr-thŏs'ē-ras, a genus of fossil cephalopods, allied to the nautilus, having straight, tapering, smooth-chambered shells, with the siphuncle central, which occur from the Silurian to the Trias. It forms the type of a family *Orthoceratidæ,* some of the species of which must have been more than six feet long and one foot wide. Related groups had shells curved in various degrees, thus approaching the coiled nautilus form.

Or'thoclase, a variety of feldspar, called common or potash feldspar, owing its scientific name to the rectangular cleavage of its crystals; it is a silicate of aluminum and potassium, with the general formula $K_2Al_2O_6.6Si$; and, occasionally has some sodium in place of the potassium. The percentage of silica is usually 65, and of potash about 12. The color is white or green, sometimes rose or yellowish; its specific gravity is 2.53 to 2.59, and its hardness 6. It is unaffected by acids, save hydrofluoric; but is de-

composed by water containing carbonic acid, the alkali being removed and clays being formed.

Orthog'raphy. See SPELLING.

Orthopæ'dics (Greek, ὀρθός, straight, + παῖς, child), a branch of medical science relating to the cure of natural deformities; not, as the name implies, restricted to children, although childhood is usually favorable to treatment. The practice of orthopædics includes prophylactic or preventive treatment and curative treatment. The object of the first is to prevent deformities in children who, from the delicacy of their constitution, are exposed to them. Its means are hygienic; and its aim is to aid by natural means the symmetrical development of the body. Among these means one of the most important is pure air. Children have been known to recover from an incipient deformity of the spine or members merely by being sent to the country. The compressed-air bath has been used with success as an auxiliary in this branch of treatment. Muscular exercise methodically applied is another resource of great importance. It has the advantage not only of developing the muscles, but of aiding digestion and secretion. Treatment by curative orthopædics has been applied with success to a great variety of malformations both of the spine and members. The manufacture of apparatus for the mechanical treatment of deformities has become a distinct branch of business, and there are in various countries numerous institutions where such treatment is systematically given. See BOW LEGS; CLUB-FOOT; DEFORMITIES; JOINT; POTT'S DISEASE.

Orthophosphoric Acid. See PHOSPHORIC ACID.

Orthop'oda, an order of herbivorous dinosaurs (q.v.), in the classification of Gadow, which includes as subordinate groups the plantigrade *Stegosauri* and the digitigrade *Ornithopoda* of Marsh. The group-characters are anatomical, especially those of the pelvis, which are very bird-like, and of the jaws, the premaxilla having no teeth. Consult: Gadow, 'Amphibia and Reptiles' (1901).

Orthop'tera, or straight-winged insects, one of the Linnæan orders of *Hexapoda,* which has undergone least change in the hands of modern systematists. The three regions of the body are distinct; the head is large with strong, biting jaws, and long or short filiform antennæ; the prothorax is usually greatly developed, and may form a shield partly covering the mesothorax; and the abdomen is usually full and terminated by a pair of claspers in the male and a more or less prominent ovipositor in the female. The anterior pair of wings are of little use in flight, but they are thickened and serve as covers to protect the broad, membranous, netted-veined hind wings, which, when not in use, are folded longitudinally like fans and concealed beneath the covers. In some genera wings are absent. Being of terrestrial habits and seldom flying far, the legs are well developed for running, leaping, or, as in the mole-crickets, for burrowing. There is a gradual change without any sudden metamorphosis from the larva to the imago, the pupa being active and differing from the adult only in the undeveloped wings and reproductive organs; nor do the larvæ differ greatly in appearance. The eggs are usually laid on the ground and sometimes, as with the grasshoppers, in nests or cells. With the striking exception of the mantids, almost all of the species are strictly herbivorous and among them are some of the most serious pests with which the husbandman has to contend. One characteristic of this group is the presence of sound-producing structures, by means of which, in some families by rubbing, in others by concussion, or by a combination of both methods, are produced the noises familiar to us as the "chirping" of crickets (q.v.), the "calling" of katydids, "whirring" of grasshoppers, etc. Examples of how such sounds are made are furnished by the locusts and grasshoppers, which produce sounds in several ways. Certain species rub the inner surface of the hind femora, upon which there is a row of minute spines, against the outer surface of the fore wing. In this case each fore wing serves as a fiddle and each hind leg as a fiddle-bow. Second, other species rub together the upper surface of the front edge of the hind wings and the under surface of the fore wings. This is done while the locust is flying, and the result is a crackling sound. Third, the males of the different kinds of true grasshoppers, including the katydids, are provided with an elaborate musical apparatus, by means of which they call their mates. This consists of a peculiar arrangement of the veins and cells of a portion of each fore wing near its base. This arrangement differs in the different species, but in each it is such that by rubbing the fore wings together they are made to vibrate, and thus produce the sound. The principal families are the *Blattidæ,* or roaches, the *Phasmidæ,* or walking-sticks, the *Mantidæ,* or praying insects, the *Gryllidæ,* or crickets and mole-crickets, the *Locustidæ,* or locusts and the *Acrydidæ,* or crickets, all of which are elsewhere described. Consult the 'Text-books' of Comstock, Packard, Carpenter, and others; and Howard, 'The Insect-book' (1901), which contains an extensive bibliography of the group.

Ortler-Spitze, ŏrt'lĕr-spĭt'sĕ, or **Ortler,** Austria, a mountain in the Tyrol, on the borders of the Engadin, 70 miles southwest of Innsbruck. It is about 12,800 feet high, and the loftiest peak in Austria. The summit commanding one of the most extensive views in the Rhætian Alps was first ascended in 1802.

Or'tolan, a European yellowish-brown bunting (*Emberiza hortulana*) famous as a dainty. It is migratory, spreading over northern Europe in summer to breed, and making its nest in bushes or small trees, and singing pleasantly. Toward autumn, when it begins to migrate southward, it is plump, and regarded as excellent eating. These birds are caught in great numbers at that season along the shores of Italy and the eastern Mediterranean, and are kept in confinement and fed for some time until they become exceedingly fat and delicate, and form a table luxury The favorite method of preparing the ortolans for table consists in roasting them in egg shells — a mode of cookery borrowed from the ancients, among whom these birds brought very high prices. In former times the Island of Cyprus formed a chief depot for the exportation of these birds, which were pickled in spices and vinegar and packed in casks containing from 300 to 400 each. From

400 to 500 casks are annually exported from Cyprus.

Orton, ôr'tôn, **Edward,** American educator and geologist: b. Deposit, N. Y., 9 March 1829; d. Columbus, Ohio, 16 Oct. 1899. He was graduated from Hamilton College in 1848, and later studied at Andover and at Harvard. In 1856–65 he occupied the chair of natural science at the Albany State Normal School, accepting in the latter year the same chair at Antioch College, Yellow Springs, Ohio, where in 1873 he was elected president. In that year he was called to the presidency of the newly founded Ohio latter year the same chair at Antioch College, which has since become the Ohio State University. His university work was of great value, as he was a natural teacher and organizer in addition to his scholastic attainments. He was assistant on the geological survey of Ohio in 1869–75, and in 1881 was appointed State geologist, which position he filled until his death, and he frequently served on United States geological surveys. He resigned his presidency of the college in 1881, but continued to fill the chair of geology during his life. Among his works are: 'Economic Geology of Ohio' (1883–8); 'Petroleum and Inflammable Gas' (1887); etc.

Orton, James, American Congregational clergyman, naturalist, and traveler: b. Seneca Falls, N. Y., 21 April 1830; d. on Lake Titicaca, Peru, 25 Sept. 1877. He was graduated from Williams College in 1855, pursued theological studies at Andover and entered the ministry in 1860. He was a professor of natural science in Rochester University in 1866 and the next year conducted an exploring expedition across South America. He was professor of natural history in Vassar College 1869–73, and at the time of his death was attached to an exploring expedition in Peru. His works include: 'The Andes and the Amazon' (1870); 'Underground Treasures' (1872); 'Liberal Education of Women' (1873); 'Comparative Zoology' (1875).

Or'tygan. See BUTTON-QUAIL.

Oruro, ō-roo'rō, Bolivia, a department lying in the western part, bounded on the west by Chile, on the south by the department of Potosi, and on the north by the department of La Paz; area, 21,350 square miles. The Andes Mountains follow the western boundary, and the Cordillera Real the eastern; the department lies in the Titicaca basin. The surface is mostly an elevated plateau, rarely sinking below the level of 12,000 feet; the salt lake of Allugas is situated in the eastern part. There are numerous marshes and saline plains, the soil in general is unfitted for agriculture, and the climate is cold. There is considerable mineral wealth, particularly in tin, silver, and copper, and mining is the chief and most profitable industry; cattle are also raised in some sections. Pop. (1898) 130,000, of which a considerable portion are Indians.

Oruro, Bolivia, city, capital of the department of Oruro; within four miles to the east of the Desaguadero River; 125 miles southeast of La Paz. It is on a plain over 12,000 feet above sea-level, about 10 miles north of Lake Allugas. It was founded in 1590, and during the 17th century was very prosperous, owing to the mines in the vicinity, having at that time over 70,000 inhabitants. Later the mines were abandoned, the population declined rapidly, and a portion of the city fell into ruins. During the last decade of the 19th century, a railroad connecting it with Antofagasta, Chile, has been the means of reviving its prosperity to a certain extent. Tin is mined in the vicinity, and considerable quantities of tin, as well as copper and silver, are exported. Pop. (estimated) 15,000.

Orvieto, ôr-vē-ā'tō, Italy, a city and episcopal see in the province of Peruggia, Umbria, 78 miles by rail northwest of Rome. It is built on an isolated tufa rock, 1,327 feet above sea level, and 765 feet above the junction of the Paglia and Chiana, is surrounded by mediæval walls, and is reached from the railroad depot by a funicular or inclined railway. The cruciform cathedral (1290–1580), one of the most beautiful and richly adorned specimens of Italian Gothic, is built of black and white marble, and measures 295 feet by 109. The façade is unsurpassed in richness of material, and in the beauty of its mosaics, sculptures, and elaborate ornamentation. The interior also is magnificently decorated with sculptures and with paintings by Luca Signorelli, Fra Angelico, etc. Two other churches of the 11th century, the bishop's palace, the Jesuit College, St. Patrick's Well (1527–1540), with its 250 steps, and the palaces Petrungeli and Gualtieri deserve special notice, the former for its fine collection of paintings, and the latter for its cartoons by Domenichino, Annibale Caracci, and other eminent masters. Orvieto, called in the 7th century A.D. Urbs Vetus — of which its present name is a corruption — is supposed to occupy the site of the Etruscan Volsinii. It was created an episcopal see in 509 A.D., and in the Middle Ages it gave shelter to 32 popes; the papal palace converted into a municipal museum in 1898, has numerous interesting local antiquities, including the contents of an Etruscan necropolis discovered on the east side of the town in 1874. Pop. (1901) with suburbs, 18,543.

Or'yx, a genus of antelopes represented by the addax, Beatrix antelope, beisa, and other species, found chiefly in northern Africa. The gemsbok of southern and central Africa is another ally. These antelopes are of comparatively large size. The horns are very long, curved, and ringed. These form powerful and effective weapons for defense, and a wounded oryx is a dangerous animal for a man to approach. Their desert habitat is indicated by the prevalent reddish-white uniform tint of their coats, almost the only distinguishing color-marks being upon the face. These antelopes are now greatly reduced in numbers, and some of the northern species are nearly extinct. One or another species is often depicted upon the monuments and mural paintings of ancient Egypt, most frequently, probably, the beisa (q.v.).

Os, Gregorius Jacobus Johannes, van, Dutch painter: b. The Hague 20 Nov. 1782; d. Paris, France, 11 July 1861. After taking a prize at Amsterdam (1809) and being awarded a gold medal at Paris (1812) he accepted employment as a designer and enamel painter at the porcelain manufactory at Sevres. He was eminently successful in the portrayal of flowers, fruit, and other still-life, but he also produced several landscapes. He was known among his French admirers as the "Rubens of flower paint-

ing.» So great was his scientific accuracy in drawing plants that he was engaged to furnish most of the illustrations in the 'Flora Batava.'

Os, Jan, van, Dutch painter (father of the preceding): b. Middelharnis, Holland, 1744; d. The Hague 1808. His studio was at The Hague throughout his artistic career; here he was director of the Académie des Belles Lettres, being a poet as well as a painter of flowers, fruits, landscapes, marines, and animals. His flowers are inferior to those of Van Huysum, whom he made his model, but his works are to be found in all important collections, and a picture of his entitled 'Flowers in a Vase, with a Cat on the Table' sold in 1883 for $1,217.

Os, Pieter Gerardus, van, Dutch painter, son of the preceding: b. The Hague 1776; d. there 1839. Although he was trained in art by his father, the flower painter, he made Paul Potter his model, and painted many famous landscapes with cattle in the foreground, and his works were eagerly sought by connoisseurs from all parts of Europe. After serving in the campaign of 1813–14 he produced several battle scenes, some of which are in the Museum at Amsterdam. He was also an excellent etcher.

Osage, ō'sāj or ō-sāj', Iowa, city, county-seat of Mitchell County; on the Red Cedar River, and on the Great Western and the Illinois Central R.R.'s; about 95 miles in direct line northeast of Fort Dodge. It is the commercial and industrial centre of a large productive agricultural region in which there are extensive dairy, nursery, and stock-raising industries. It is the seat of the Cedar Valley Seminary, and it has the Sage Public Library. The city owns and operates the waterworks. Pop. (1890) 1,913; (1900) 2,734.

Osage, a river which has its rise in the eastern part of Kansas and enters the State of Missouri at Bates County, flows east and northeast, and joins the Missouri River about 10 miles below Jefferson City. It is about 495 miles long, and navigable, part of the year, 200 miles from the Missouri. It is a winding stream with many deep curves of nearly parallel sides.

Osages, a tribe of North American Indians of Siouan origin, now as the Osage Nation occupying a reservation in northeast Oklahoma on the east bank of the Arkansas River. In the 17th century they were inhabiting an extensive region between the Arkansas and Missouri rivers, and were early allies of the French, distrusted by, and in frequent warfare with, the neighboring Cherokee, Chickasaw, Creek, Choctaw, and other Indians. The Osage Nation is said to be the richest community in the world. They own nearly 1,500,000 acres of land, worth not less than $10 an acre. Besides this they have in the United States Treasury nearly $8,000,000, derived since 1808 mainly from the judicious sale of superfluous lands, and drawing interest at the rate of 7 per cent. Each Osage Indian, man, woman and child, is worth at least $15,000, and each family on a division would possess on an average $60,000. The property is held and owned in common, and all their industries are nationalized. Their prosperity, however, has led to decadence and they are fast diminishing in numbers. From over 7,000 at the commencement of the 19th century they numbered in 1901, 1,790.

Osage Orange (*Toxylon pomiferum*) a tree of the order of *Urticaceæ*, growing wild in the southwestern parts of the United States. It was first found near a village of the Osage Indians, which fact, connected with the globular form and golden color of its fruit, originated its popular name, but it has no botanical relationship to the true orange. The Osage orange, also called bow-wood (by French-American writers bois d'arc) and yellowwood is a striking and beautiful lactescent tree, growing 30 or 40 feet high; its foliage is not unlike that of the orange tree, but more glossy and polished and of a bright green color. Its branches spread widely into a broad head; its flowers are dicœcious, small, pale yellowish green; the barren are about 12 in number, borne in a very short, almost sessile, racemose panicle. The fruit has about the size and appearance of a large orange, yellow when ripe and roughened on the outside, containing a mucilaginous fluid, insipid and uneatable. The sap of the young wood and leaves is milky, and contains a large proportion of caoutchouc; the color of the wood is a bright yellow; its grain is fine and elastic, on account of which property it is employed by the southern Indians for bows. The young branches, beset with sharp, straight thorns, have suggested the employment of the tree for making live hedges, which succeed admirably where the winters are not so severe as to kill the annual growth. Treated as a hedge plant, it has many excellent characters but in order to form a compact growth, two shearings in a season are requisite. It is easily cultivated and propagated, and pieces of the root planted out in the nursery, with the tips just exposed above the earth, will readily grow; seeds procured from fertile trees may be sown in broad drills, a quart of seed producing at least 5,000 plants. The bark affords a strong fibre of a flaxy character and the bark of the root is used by the country-people of the Southern States as the material for a yellow dye.

Osaka, ō-sā'kā, or **Ozaka,** Japan, the second largest city of the empire, and one of the three imperial cities, on the island of Hondo, at the mouth of the Yodo in the Gulf of Osaka, 20 miles by rail southeast of Kobe, and 27 miles southwest of Kioto. It is of great commercial and industrial importance, and has been likened to Chicago, on account of its progressiveness and modernization, to Glasgow for its industry and thrift, and to Venice for its beauty and quaintness. The city covering an area of 27 square miles lies upon either bank of the River Yodo and upon an island in the middle of the river; the many intersecting canals and the bridges (over 1,000) spanning these give the Venetian effect. The rich business and manufacturing section on the south bank of the river is Chicago, and the western quarter, monopolized by the shipping interests, is Glasgow. The island in the midst, which is the heart of the city, bears the poetical name of Nakanoshima, while anciently Osaka itself was known as Naniwa, meaning «dashing waves.»

In the upper town, the fine castle, the stones of its walls of astonishing size, was constructed by Hideyoshi's orders in 1583, and the palace, built afterward in its precincts and destroyed in the civil war of 1868, was perhaps the most magnificent structure in Japan. Another notable edifice is the Sumiyoshi temple founded by the

consort of the 14th emperor. The fine modern harbor protected by a mole has a depth of 28 feet at low water, and hundreds of steamers and sailing craft ply between its wharves and the ports of Formosa, Korea, and China. Cotton spinning is the principal of its numerous manufacturing industries; in 1903 there were fourteen cotton mills, employing 20,000 operatives — three fourths of them women and girls; other important manufactures are those of iron and steel products, glass, boots and shoes, chemicals, matches, tobacco, and clocks; shipbuilding is also a considerable industry. The foreign settlement is on the deltaic island of Kawaguchi. Osaka was opened to foreign trade and residence in 1868. Pop. (1898) of city, 821,235, with suburbs, 1,311,909.

Osawatomie, ŏs-ą-wŏt'ō-mē, Kan., city in Miami County; near the Osage and Pottawatomie rivers, and on the Missouri Pacific railroad. Its name comes from the two rivers mentioned. It is in a stock-raising and agricultural section, and in a natural gas belt. A few settlers were in this section about 1850, but in 1855 the place was organized by the Emigrant Aid Society as a "free-State" settlement. John Brown (q.v.) was interested in this settlement, and for a time lived on a farm nearby. On 30 Aug. 1856 the town was attacked by a band of pro-slavery sympathizers; John Brown and his friends made a vigorous resistance, but were finally overcome. The city is the division headquarters for the Missouri Pacific railroad, and has the railroad shops, machine-shops, flour mills, and large stock yards. It is the seat of the State Insane Hospital opened in 1866, which has over 1,000 patients each year. Some of the prominent buildings are the city library, city-hall, the Agnew Opera House, a Masonic temple, the churches, and schools. The charter of 1883, revised in 1890, provides for a mayor and council who appoint or elect the administrative officials. Pop. (1890) 2,662; (1900) 4,191.

Os'bon, Bradley S., American naval officer: b. Rye, N. Y., 16 Aug. 1828. He went to sea at 10, and served in the Chinese navy as coxswain, in the Argentine navy as commander, and was an admiral in the Mexican navy. In the Civil War he served under Du Pont, Worden and Farragut, receiving honorable mention by the latter. As volunteer naval scout in the Spanish-American war he was the first to discover the proximity of Cervera's fleet off Curaçoa, 14 May 1898, for which he received the thanks of the government. He has since served in the Arctic and Antarctic oceans and in 1900 he became flag-officer commanding the United States Veteran Navy with the rank of commodore. He has published: 'Osbon's Hand Book U. S. Navy' (1864); and 'U. S. Veteran Navy List' (1900).

Osborn, ŏz'bėrn, **Henry Fairfield,** American palæontologist: b. Connecticut 1857. He was graduated from Princeton University in 1877 and in 1880 was assistant professor of anatomy there. Later he became professor of zoology at Columbia University which post he still occupies. He is vice-president of the American Museum of Natural History, and since 1900 has been palæontologist of the United States Geological Survey. He has published: 'From the Greeks to Darwin' (1894); numerous scientific papers, addresses, etc.

Osborn, Herbert, American biologist: b. Lafayette, Wis., 19 March 1856. He was educated at Iowa State College and was professor of zoology and entomology there 1880–98. Since July 1898, he has been State entomologist of Iowa, and has filled the chair of zoology and entomology at the Ohio State University. Among his professional writings are: 'Peduculi and Mallophaga of Man and the Lower Animals' (1891); 'Insects Affecting Domestic Animals' (1896); 'The Hessian Fly in the United States' (1898); 'The Genus Scaphoideus' (1900).

Osborn, Laughton, American poet: b. New York 1809; d. there 12 Dec. 1878. He was graduated from Columbia in 1827, devoted his attention chiefly to literature, but was also an amateur musician and painter of good ability. His verses in French and Italian he wrote with a facility almost equal to that which he displayed in English. A large part of his work appeared anonymously. Of his books, many with impressive titles, but the most of them now little read, may be cited: 'Sixty Years of the Life of Jeremy Levis' (1831); 'Handbook of Oil-Painting' (1856); 'Bianca Capello, a Tragedy' (1868); 'The Montanini — The School for Critics — Comedies' (1868); 'Ugo da Este — Uberto — The Cid of Seville: Tragedies' (1869); 'Meleagros — the New Calvary: Tragedies' (1871); 'Marianne' (1873).

Osborn, Sherard, English author and navigator: b. Madras, India, 25 April 1822; d. London, England, 6 May 1875. He entered the navy in 1837 and was ordered to the East Indies where at 17 he commanded a ship in the blockade of Quedah. In 1849 and in 1852–5 he was in command of one of the ships in the expedition sent in search of Sir John Franklin. He served in the Crimean war; in China, and Japan in 1857–9; and in 1862 commanded a fleet for the suppression of piracy. He superintended the laying of the submarine telegraph between Australia and Great Britain and in 1873 was made rear-admiral. He wrote: 'Stray Leaves from an Arctic Journal' (1852); 'The Career, Last Voyage, and Fate of Sir John Franklin' (3 vols. 1860); 'The Past and Future of British Relations in China'; etc.

Osborn, Thomas Ogden, American lawyer: b. Jersey, Ohio, 1832. He was graduated from the Ohio State University in 1854, studied law and in 1859 established a practice in Chicago, Ill. At the outbreak of the Civil War he organized and became colonel of the 39th Illinois Volunteers; commanded four regiments at the capture of Fort Sumter, and rose to the rank of major-general of volunteers. He returned to his practice after the war, was treasurer of Cook County, Ill., and manager of the National Soldiers' Home; he served as member of the commission appointed to settle disputed claims between United States and Mexico, and in 1873–85 was United States minister to Argentina.

Osborne, (Samuel) Duffield, American novelist: b. Brooklyn, N. Y., 20 June 1858. He was graduated from Columbia in 1879 and from the Columbia Law School in 1881 and practised law in New York 1881–92. He has published

'The Spell of Ashtaroth' (1888); 'The Robe of Nessus' (1890); 'The Secret of the Crater' (1900); 'The Lion's Brood' (1902).

Osborne House, a large English villa, formerly the residence of Queen Victoria, situated near East Cowes (q.v.) in the Isle of Wight. The estate was willed to the Prince of Wales, who on the day of his coronation as Edward VII. announced his intention of presenting it to the nation, the building to be used (with the exception of the apartments that Queen Victoria had personally occupied and that are to be kept open to the public) as a convalescent home for officers of the army and navy.

Osbourne, Lloyd, American author: b. San Francisco, Cal., 7 April 1868. He was educated at Edinburgh University, traveled extensively and was at one time United States consul at Samoa. He wrote in collaboration with Robert Louis Stevenson: 'The Wrong Box' (1889); 'The Ebb Tide' (1894); etc. Among his own works are: 'The Renegade'; 'The Queen vs. Billy' (1900); etc.

Os'cans. See OSCI.

Os'car I. (JOSEPH FRANÇOIS BERNADOTTE), king of Sweden and Norway: b. Paris 4 July 1799; d. 8 July 1859. He was educated at the Lycée Louis le Grand and after his father had been chosen Prince-Royal of Sweden (see BERNADOTTE) he joined him in that country, and was proclaimed Duke of Sudermania. During the reign of his father he was three times, in 1824, 1828, and 1833, viceroy of Norway, where he made himself popular by his good administration. He afterward continued to study in retirement until the death of his father (4 March 1844) the social and political questions of the day. On his accession to the throne he immediately commenced a series of political reforms which did not, however, fulfil expectations. He resigned the government in 1857 to his eldest son (afterward Karl XV.). He wrote several works on political subjects, one of which, 'On Penal Laws and Establishments for Repression,' has been translated into French and German. He also composed an opera, and various other pieces of music. Oscar II. (q.v.), the present king, is his third son.

Oscar II., king of Sweden and Norway: b. Stockholm 21 Jan. 1829. He was a great-grandson of Napoleon I.'s famous general, Marshal Bernadotte, the first king of the new independent kingdom of Norway. He was trained in the navy and at the University of Upsala, and ascended the throne in 1872, in succession to his brother, Charles XV., and was crowned 11 May 1873 at Stockholm and 18 July at Drontheim. He was recognized as a talented sovereign, speaking, it is said, at least 10 languages with readiness, being well versed in naval and military history and general literature, and winning laurels as critic and poet. Among his writings are 'Some Contributions to the Military History of Sweden 1711–13' (1859–65); 'Memories of the Swedish Fleet' (1858), and translations from the German of Goethe's 'Tasso' and Herder's 'Cid.' He was elected an honorary member of the Berlin Academy, and of the Imperial Society of Naturalists of Moscow. His collected works appeared in 1875–90. They were rendered into German by Jonas (verse 1877, 1888; prose 1891).

Osceola, ŏs-ē-ō'lą, or **As-se-he-ho-lar,** that is, "Black Drink." Seminole chief: b. near the Chattahoochee River, Ga., 1804; d. Fort Moultrie, S. C., 30 Jan. 1838. He was a half-breed, his father being William Powell, an English trader, and his mother the daughter of an Indian chief; with her he was taken to Florida when he was four years old. His mixed blood made him no fonder of the whites than were the other members of his tribe, with whom he soon became an influential leader because of his personal bravery and his hatred and contempt of his father's people. He showed his boldness in opposing the cession of the Seminole lands in Florida. But his passive opposition was roused in 1835 to open hostility; his wife, the daughter of a fugitive slave, was seized and carried into slavery; in his anger Osceola threatened the Indian agent, General Thompson, so rudely that he was seized, imprisoned, and kept in irons for six days. Osceola precipitated the second Seminole war by massacring Thompson and four others a few months later, 28 Dec. 1835. His men who had killed Major Dade and his 110 soldiers on the same day were unsuccessful 31 December in a fight with Clinch, but they took refuge in the Everglades, emerging now and again, as in the assaults on Micanopy and Fort Drane, never winning a battle, but always led with great skill and daring, and keeping the country in terror. Two years after, 21 Oct. 1837, he was seized by General Thomas Jesup, with whom he was conferring under a flag of truce, and who excused his treachery by Osceola's alleged disregard of treaties. With several followers he was imprisoned at Saint Augustine, and then at Fort Moultrie, where he died in a few months.

Osceola's Rebellion. See SEMINOLE WAR.

Os'ci, or **Oscans** (Greek, *Opikoi*), an Italian people who appear to have been the original occupants, at the earliest known period, of Central Italy from Campania and the borders of Latium to the Adriatic. The Oscans were subdued by the Sabines, a people from the Apennines on the north, of whose previous history little is known, and who probably adopted the language and customs of the conquered, with what modifications cannot be ascertained. The Oscan language was closely allied to the Latin, of which it was probably a parent stock. It appears to have been spoken in the provinces long after Latin became the official language, and it was used officially long after the Roman conquest.

Oscines, ŏs'ĭ-nēz, a group of passerine birds possessing highly developed vocal organs, and including most of the "singing-birds" of the world. See ORNITHOLOGY.

Oscott (ŏs'kŏt) **College,** a Roman Catholic institution founded in 1752 as a college and seminary for priests. It played a considerable part in the education of English Catholics when they were yet excluded from the English universities. The school is also called Saint Mary's Seminary. The courses in secular subjects qualify for the degree of B.A. in the London University.

Ösel, ĕ'zĕl, or **Oesel,** Russia, an island of the government of Livonia, in the mouth of the Gulf of Riga, and after Seeland the largest island in the Baltic; area, 1,998 square miles.

The principal town Arensburg (pop. 1897, 4,621) is on the southeast coast. The coast is generally bold, and the interior undulating. The soil, gravelly and not naturally rich, becomes productive by careful culture, and raises corn for export, hemp, and flax. The pastures are good, the forests large, and the fisheries valuable. Pop. (1897) 56,869.

Osgood, ŏz'gŭd, **Samuel,** American soldier and legislator: b. Andover, Mass., 14 Feb. 1748; d. New York 12 Aug. 1813. He was graduated from Harvard in 1770, engaged in a mercantile career, but public affairs absorbed much of his attention and in 1775 he was a captain of minutemen at Lexington. For a time he acted as aide to General Artemus Ward, but in 1780 entered the Continental Congress where he served until 1784. In 1785–9 he was commissioner of the United States treasury, the first to occupy that office; and in 1789–91, postmaster-general. Later he was speaker of the New York assembly and in 1801–3 supervisor in New York. From 1803–13 he was naval officer at the port of New York.

Osgood, Samuel, American clergyman and author: b. Charlestown, Mass., 30 Aug. 1812; d. New York 14 April 1880. Graduated from Harvard in 1832, and from the Cambridge divinity school in 1835, he was later editor at Louisville (Ky.) of the 'Western Messenger,' was pastor of a Unitarian Church at Nashua, N. H., in 1837–41, and of the Westminster Church, Providence (R. I.) in 1841–9. From 1849 until his resignation in 1869 he was pastor of the Unitarian Church of the Messiah, New York. In 1870 he took orders in the Protestant Episcopal Church, but he did not take up parochial work in that communion. From 1870 until 1880 he was chiefly active as corresponding secretary of the New York Historical Society, a contributor to periodicals, and an occasional lecturer. Among his publications were: 'Studies in Christian Biography' (1851); 'God with Man' (1853); 'American Leaves' (1867).

O'Shaughnessy, ō-shâ'nĕ-sĭ, **Arthur William Edgar,** English poet: b. London 14 March 1844; d. 30 Jan. 1881. In 1861 he became a junior assistant in the library of the British Museum, and in 1863 assistant in the zoological department. He won recognition as an authority in herpetology. But he was better known as a poet, his volumes being: 'An Epic of Women' (1870); 'Lays of France' (1872), a free paraphrase of the *lais* of Marie de France; 'Music and Moonlight' (1874); and 'Songs of a Worker' which appeared posthumously. O'Shaughnessy showed great promise, though his later work evinced increase rather in metrical and verbal facility than in intellectual force.

Oshiba, ō-shē'bä, or **Ossieba.** See FANS.

Oshima, ō-shē-mä', Japan, a name signifying "great island," applied to numerous island dependencies of the empire. The chief are (1) Oshima or Vries Island southwest of the entrance to the bay on which stand Tokyo and Yokohama; (2) Oshima off the southwest extremity of Hokkaido, opposite Fukuyama; (3) Amami-Oshima one of the largest islands of the Liu-Kiu Archipelago (q.v.).

Osh'kosh, Wis., city, county-seat of Winnebago County; on Lake Winnebago at the mouth of the Upper Fox River, and on the Chicago & N. W., the Chicago, Milwaukee & S. P., and the Wisconsin Central R.R.'s; about 75 miles northwest of Milwaukee and 85 miles northeast of Madison, the State capital. It was settled in 1836, and in 1853 was chartered. The city was greatly damaged by fires in the years 1859, 1866, 1874, and 1875. It is in a region where there has been extensive lumbering interests, and although the forests have disappeared in some sections, lumber is still a leading industry. The chief manufactures are lumber and lumber products, as furniture, matches, sash, doors, and blinds, wagons and carriages. It manufactures also machine products, grass twine, malting, beer, flour, canned goods, and agricultural implements. It has a large trade, as the city is the commercial centre of a considerable portion of Winnebago and the adjoining counties. Lake Winnebago is noted for its fish, and sportsmen find in the vicinity good hunting grounds. Yachting in summer and ice-boating in winter are favorite sports on this lake. The prominent buildings are the government building, city-hall, court-house, and the churches and schools. It has Saint Mary's Hospital, and about three miles distant are the State Northern Hospital for the Insane, the County Hospital for the Incurable Insane, and the County Almshouse. Oshkosh is the seat of a State Normal School, and has public and parish schools, and a public library. The government is vested in a mayor, who holds office two years, and a council. The administrative officials are appointed by the mayor subject to the approval of the council, or elected by the council, except the school board, the members of which are chosen by popular vote. Pop. (1890) 22,836; (1900) 28,284.

Osiander, ō-zē-än'dĕr, **Andreas** (classicized form of HOSEMANN), Lutheran theologian: b. Gunzenhausen, near Nuremberg, 19 Dec. 1498; d. Königsberg 17 Oct. 1552. As first evangelical preacher at Nuremberg, he exerted himself in furthering the Reformation and Lutheranism, taking part against Zwinglius on the subject of the Lord's Supper. He was also present in the conference at Marburg in 1529 and at the Diet of Augsburg (1530). His refusal to consent to the Augsburg interim in 1548 cost him his position at Nuremberg. By Duke Albert of Prussia, on whom one of his sermons had produced a strong impression, he was appointed preacher and first professor of theology in the newly erected University of Königsberg, and vice-president of the bishopric of Samland. Meanwhile, in 1549, he became involved in a theological dispute, which was embittered by his obstinacy. In a discussion, 'De Lege et Evangelio,' he maintained that justification is not a judicial or forensic act in God, but contained something of a subjective nature, as the imparting of an interior righteousness, brought about in a mystical manner by the union of Christ with men. These views he continued to maintain till his death. Consult Moller, 'Andreas Osianders Leben und ausgewählte Schriften' (1870).

Osier, the popular name of those species of willow (q.v.) which are used chiefly for basket-making and other wickerwork. They are of low bushy growth, and they are the more valuable in proportion to the length, slenderness, suppleness, and toughness of their branches. The common osier (*Salix viminalis*), a common native of wet alluvial grounds in many

parts of Europe, is cultivated to supply material for basket-makers, and also is often planted to prevent the banks of rivers from being washed away. There are several varieties in cultivation, not easily distinguished except by a very practised eye, but much more useful than the original or wild kind, which is apt to break, and therefore of little value. See WILLOW.

Osiris, ō-sī'rĭs, in Egyptian mythology, meaning "full of eyes," a son of Isis, or as is claimed by some authorities, the brother and husband of Isis, and the father of Horus. He is styled the Manifester of Good, Lord of Lords, King of the Gods, etc. In the Egyptian theogony he represented the sum of beneficent agencies, as Set of evil agencies. The struggle between these opposing agencies was thus personified in two individuals, as in the later theogony of Persia. Osiris, after having conquered all Egypt, and established good laws and institutions, fell a prey to the intrigues of his brother Set, the Typhon of the Greeks. He became afterward the judge of the dead. There are a multitude of traditions, both Greek and Egyptian, about Osiris. He is represented under many different forms, and compared sometimes to the sun and sometimes to the Nile. In particular his soul was supposed to animate a sacred bull called Apis, and thus to be continually present among men; for when the bull Apis died the priests selected another, into which the divinity entered. Sometimes he is represented as a man crowned with a mitre, a globe, a lotus-flower, or an elephant's trunk; sometimes with the body of a man and the head of an ox, ibis, or other animal; sometimes he holds a stick, sometimes a phallus, in his hand. He holds, in some representations, a whip in one hand and a scourge in the other. He has frequently the horns of a bull. The worship of Osiris was introduced into Rome, but the rites proceeded to such an excess of licentiousness that it was at length prohibited by law.

Oskaloosa, ŏs-ka-loo'sa, Iowa, city, county-seat of Mahaska County; on the Chicago, Burlington & Q., the Iowa Central, and the Chicago, Rock Island & P. R.R.'s; about 65 miles southeast of Des Moines. It was settled in 1843 and incorporated in 1853. It is the commercial centre of a fertile agricultural region in which stock-raising is given much attention. In the vicinity are large coal-fields, and deposits of limestone and fire-clay. The chief industries are flour and grist milling, manufacturing vitrified brick, wagons, iron and brass goods, heaters, and woolen goods. It has a large meat-packing plant, and coal and brick yards. The principal buildings are the post-office, the church, school and library buildings. The educational institutions are the Penn College, opened in 1873 under the auspices of the Friends, the Oskaloosa College, under the auspices of the Disciples of Christ, a business school, and a public library. The Society of Friends of the State of Iowa hold their annual meeting in this city. Pop. (1890) 6,558; (1900) 9,212.

Osler, ōs'lĕr, **William,** American physician: b. Tecumseh, Ont., 1849. He was graduated from McGill University, Montreal, and was professor of medicine there in 1874–84. In 1884 he was professor of clinical medicine at the University of Pennsylvania and since 1889 has been professor of medicine and surgeon to the hospital at Johns Hopkins Medical School. He has written: 'The Cerebral Palsies of Children' (1889; 'Cancer of the Stomach' (1900); etc.

Osman Digna, ŏs-măn' dĭg'na ("Osman the Bearded"), Sudanese chief: b. 1836. His early history is not known; a romantic story tells that he was of French birth and came from Rouen with his parents, named Nisbet, in 1849 to Alexandria or Suakim, where his mother married an Arab merchant named Osman; but it seems quite as likely that he was an Arab himself and a native of Suakim. He was a slave-trader; suffered financial losses because of English interference with his ships; raised an army of 20,000 men in 1881–2 to assist Arabi Pasha against the English; became chief of the sheiks of Eastern Sudan fought the English with varying success, contributing largely to Gordon's capture and death by blocking the approach to Khartum, through Suakim; was the hero of a long and costly siege at Tokar in 1887–8; joined the Mahdi in the rising of 1899; and in 1900 was taken by stratagem (or treachery) and imprisoned at Rosetta.

Osman Nuri Pasha, noo'rē păsh'â, called GHAZI, "the Victorious," Turkish general: b. Amasia, Asia Minor, 1837; d. Constantinople 5 April 1900. Educated at Constantinople, he became lieutenant of cavalry in 1854, saw service in the suppression of the revolt of the Druses in 1860 and of the rising in Crete in 1867, fought under Redif Pasha in the Yemen campaign of 1871, became marshal after the war in Servia in 1876, and in the war with Russia, after bold and brilliant maneuvers, occupied Plevna, which he was forced to surrender 10 Dec. 1877, in spite of his heroic attempt to break through the forces of his besiegers. He was carried a prisoner to Russia, returned to Turkey after the Treaty of San Stefano, was entrusted with the reorganization of the Turkish army, and served as minister of war 1880–5, and as a marshal of the palace from 1880 until his death. Consult Levaux, 'Ghazi Osman Pacha, Souvenirs historiques' (1891).

Osmanie, ŏs-mă'nē-ā, **Imperial Order of.** See ORDERS, ROYAL.

Os'melite, the same as PECTOLITE (q.v.).

Os'mium, a metallic element of the platina group, commonly found with iridium (q.v.). It was discovered by Tennant in 1804. Osmium-iridium is found in the minerals called Neoyanskite and Syfferskite in the form of very hard black grains; as a cubic or obtuse rhombohedral crystal it is bluish white, with violet lustre, and greater hardness than glass. The element has the atomic weight 191, and the high specific gravity of 22.5; it gets its name from the peculiar odor of osmic acid. Osmium is very infusible, but can be fused by the heat of an electric arc. It forms three chlorids, $OsCl_2$, $OsCl_3$, and $OsCl_4$; the oxids, OsO, Os_2O_3, OsO_2, OsO_3 and OsO_4, commonly called osmic acid, which has pungent and poisonous vapors, is extremely volatile, and is a powerful oxidizer. In alloy with iridium, osmium is used for pointing gold pens. An osmium lamp invented by Auer von Welsbach yields a pure white light, and gives little heat.

Osmo'sis, the diffusion of fluids through membranes. If a septum composed of either organic (such as a bladder) or inorganic (such as porous earthenware) be interposed between two liquids holding different substances in solution, the liquids will pass through the septum carrying some of the matter in suspense with them; that is, they will diffuse one into another. This phenomenon is called osmosis. The liquids pass through the interposed medium at different rates, gradually getting slower, until they are said to be balanced. If a bladder filled with a solution of sugar be immersed in water, seven parts of water (by weight) will enter the bladder while one part of sugar escapes into the water. The action of the liquid parting with its soluble matter is called endosmosis, the flow of the liquid receiving it exosmosis. Both must act simultaneously, one cannot exist independently of the other; together they constitute the phenomenon of osmosis. Sugar has the strongest power of endosmosis among the vegetable substances and albumen among the animal. Endosmosis usually takes place in the direction of the denser liquid, although there are some exceptions, such as ether, alcohol, etc., which act like liquids heavier than water. This diffusion has variously been explained by capillary attraction, unequal absorption, and chemical action. The latter theory would seem to be the most plausible as the septum is generally found to have been acted upon and in a state of corrosion. The laws of osmosis apply also to gases. Diffusion of dissolved substances takes place only to the limit of saturation of a liquid, and exerts an osmotic pressure comparable to gas pressure and subject to the same laws. In order to have osmosis take place the liquids on either side of the interposing septum must be of unequal osmotic pressure. (See CHEMISTRY.)

Osmosis plays an important part in plant physiology. The plant cell consists of a mass of protoplasm enclosed within a flexible organic membrane (the cell wall) which encloses a fluid. This membrane is permeable to water and generally to all substances it may hold in solution; but the protoplasm itself is only permeable to water containing such substances as it requires for its nutrition — it would seem to be endowed with the power of selection. Thus cells in different plants, or cells in different parts of the same plant, possess very different powers of osmosis. Water is the only solvent in plant life. When a cell becomes full or swollen it is said to be turgid, but this turgidity is constantly relieved by osmosis taking place from cell to cell and by final evaporation. As soon as the osmotic pressure in one cell falls below that of a cell or cells with which it is in juxtaposition, osmosis takes place, and thus a fair degree of equilibrium is maintained. Osmotic pressure is enhanced by electrolytic dissociation (see DISSOCIATION) which takes place in plant life on account of the presence of acids and salts (electrolytes) of various kinds which are found in solution both in and surrounding all plant life. The phenomena of osmosis still present a fertile field of research for the scientific mind. See ABSORPTION; SOLUTIONS.

ARTHUR S. WITHERSPOON,
Editorial Staff, 'Encyclopedia Americana.'

Os'mun, Thomas Embley ("ALFRED AYRES"), American orthoepist: b. Montrose, Ohio, 26 Feb. 1834; d. New York 26 Oct. 1902. He was graduated from Oberlin College and later studied medicine in Paris and Berlin. In 1859 he returned to the United States and settled in New York. Resolving to make a life-work of the purification of the English language as used in the public press, he became an authority on the use of English, and also attained distinction as a dramatic critic. Subsequently he taught elocution and in 1891 he appeared as Shylock in Boston and other New England cities. He published: 'The English Grammar of William Cobbett' (1884); 'The Orthoepist' (1884); 'Some Ill-Used Words' (1901); etc.

Osmun'da, a genus of tall swamp ferns with free capsules (sporanges) opening by a longitudinal slit. The root-stocks are large and erect or creeping. The sporanges are large, globose, naked, and situated on the margins of their rachis-like divisions. The spores are copious and green. One species, the royal fern (*O. regalis*), is cultivated in various parts of the world on account of its elegant appearance. It grows in clumps of 2 to 5 feet in height, and is well adapted for open moist places, where the soil is rich and shade thin, or even where full sunlight falls. Consult Bailey, 'Cyclopedia of Horticulture' (1901).

Osnabrück, ŏs'nä-brük, Germany, a town of Hanover, Prussia, on the Haase, 70 miles west of Hanover. In the old town the streets are generally narrow and the houses low; but the new quarters have wide and handsome streets, and fine residences. The chief buildings are the ancient Protestant churches of Saint Catherine and Saint Mary; the Roman Catholic cathedral; the Protestant and Roman Catholic gymnasiums, the town-house, with statues (1889–90) of German emperors on the façade; the Friedenssaal (Hall of Peace), restored in 1890; the museum (1889), the new hospital, and the commercial school. Osnabrück has iron and steel works, railway workshops, machine-shops, iron-foundries, wire-works, paper-mills, flax and cotton-mills, bleach-fields, tile-works, breweries, etc. Osnabrück gave its name to the coarse linen known among English-speaking people as osnaburgs. It was created a see in 888, and in 1082 was surrounded by walls. It afterward entered the Hanseatic League, but never became a free imperial city. The negotiations for the Peace of Westphalia, which ended the Thirty Years' war, were carried on here. Pop. (1900) 51,574.

Osorio, Manoel Luiz, mä'noo-ĕl loo-ĕth' ō-sō'rē-ō, Brazilian soldier: b. near Pelotas, Brazil, 10 May 1808; d. Rio de Janeiro, Brazil, 4 Oct. 1879. He entered the army at an early age and in the civil war in Rio Grande do Sul, 1839–45, he attained distinction. In the campaign in Uruguay in 1851–2 he was again prominent and at the outbreak of the Paraguayan war in 1865 was made commander-in-chief, but was superseded by Caxias in 1866. He was made lieutenant-general in 1867 and continued to serve until 1869 when he was seriously wounded. He entered politics after the war, became senator in 1877 and from 1878 until his death was minister of war. He was created Marquis of Herval by the government, but his chief title of honor was "O Legendario" (the Fabulous) bestowed upon him by his soldiers for his bravery.

Os'prey. See FISH-HAWK.

Ossa, ŏs'ạ, Greece, the classic name of Kissavos, a mountain 6,408 feet high, in the northeast of Larissa, overlooking the Gulf of Saloniki. The Vale of Tempe separates it from Olympus, 9,794 feet high, and to the southeastward is Mount Plessidi — ancient Pelion — 5,308 feet high. These three mountains are renowned in Greek mythology, and the classic phrase "piling Ossa upon Pelion" refers to the giants Ephialtes and Otus arranging to place Ossa upon Pelion to aid them in reaching the summit of Olympus. This conception is said to have been suggested by the conical form of Ossa and the flat summit of Pelion. The seats of the Centaurs and Giants are located in the neighborhood of Ossa and Pelion.

Ossein, ŏs'ẹ-ĭn, the organic basis of bone allied to gelatine. If a bone is placed in acid, 20 per cent hydrochloric, the inorganic matter (salts, etc.) is dissolved out and by repeated washings only the organic matter remains. This retains the shape of the bone without its hardness. It will not dissolve in cold water, but if boiled it reduces to gelatine. See BONE.

Ossian, ŏsh'ĭ-ạn, or more correctly, **Oisin,** appears in Gaelic literature and legend as the son of Finn, or Find, the hero of what has been styled the Fennian or Oisianic cycle of tales and poems current in Ireland and the highlands of Scotland. Finn is the hero of all these tales and poems, as Arthur is of the Arthurian cycle; Oisin is his poet and bard, as well as his son. This Oisianic cycle exists side by side with a heroic cycle which consists of about 30 tales, forming one of the most complete epic cycles to be found in any literature. They are tales of battle, narratives of adventure, all circulating round the person of the hero Cuchulaind. They are mixed prose and verse and many of them are extant in manuscripts written about the 12th century. The Oisianic cycle is of a different period. Finn, the heroic figure, is a less legendary and mythological personage than Cuchulaind; he lives in the 3d century at the time when the Romans occupied Great Britain and moves through the story almost like a historical character; the supernatural is almost entirely lacking in his adventures, and he fights his battles as a leader of mercenaries engaged, after the country has been conquered, in keeping the native races of Scotland in check. These stories are found in good manuscripts of the 15th century and their style points to the fact that a stage of culture has been reached by the rude inhabitants of North Britain very different from that described in the heroic cycle, where Medb, queen of Connaught, contends with Mac Nessa, king of Ulster, for the possession of the brown bull of Cualnge, and Cuchulaind defends Ulster single-handed and discomfits with his unaided sword the valor of whole armies. In the heroic cycle the characters are completely mythological, but they are distinctly described as to their dress or arms. In the Oisianic cycle the figures of the actors become more vague; there is an exaggeration in the reported exploits of the warriors, although the excitement of the hunt, and the riot of the royal drinking bout, as therein depicted, are evidently clear transcripts from the primitive life of their period. There is one important point to be noted with regard to these two types of ancient Celtic literature in Scotland. They are as distinct in style, color, and development as in their *dramatis personæ*. They belong to different eras, and their heroes never meet on the same stage; the hero of the earlier cycle has vanished when Finn, the Oisianic warrior, comes upon the battlefield.

This is a very important part in deciding one of the most angry literary controversies of the 18th century. The Celtic legends as they were preserved orally or in manuscript attracted the fancy of James MacPherson (q.v.), a Scottish schoolmaster, who published what he averred to be translations from "the Gaelic or Erse" in the shape of "Fragments of Ancient Poetry" (1760) and subsequently produced 'Fingal' (1762) and 'Temora' (1763), afterward collected into a single volume under the title 'The Poems of Ossian.' There was much merit in these works as poems. The descriptions of scenery were often beautiful, and approaching the sublime, and the wildness of highland mountain and lake was vividly portrayed. But apart from the want of detail in the account given of the dress, buildings and social life of the personages introduced there was one circumstance that proved these poems to be anything but translations of a connected "Gaelic or Erse" composition. The heroes of the heroic cycle were made to mingle with the heroes of the Oisianic cycle in the narrative. And this was not all. MacPherson never produced during his lifetime the original poems which he averred were in his possession. After his death, however, some manuscripts were found in which fragments from both periods of genuine ancient poetry were found patched together in a cento with some very indifferent Gaelic of his own, and so arranged as to form a sort of counterpart to his 'Poems of Ossian.' The more recent studies in Gaelic literature have furnished us with this solution of the Ossian controversy; and have made it apparent that, while MacPherson might have been at liberty to fuse certain ancient poems, as Fitzgerald has done in his Omar, to produce a beautiful romance of his own, he committed a grave and unpardonable error in attempting to forge originals to support his claim that his work was a translation pure and simple. Consult: Simpson, 'Poems of Ossian' (1857); McLauchlin, 'The Book of the Dean of Lismore' (1862); Nutt, 'Ossian and the Ossianic Literature'; Windische, 'Die Altirische Sage und die Ossianischen Gedichte' (1878).

Os"sifica'tion, the process of bone formation, which in all cases essentially consists of the deposition of earthy or calcareous matter. It may exhibit two modes of occurrence. Bone may be formed by the deposition of earthy or osseous material in fibrous membranes, that is, in tissues composed of fibres and cell elements. The flat bones of the skull or cranium are developed in this first manner. No granular or intermediate stage is observable in this process, the earthy matter being simply deposited in spaces which result from absorption. In the second mode, exemplified in the formation of the long bones of the skeleton, the osseous material is deposited in a primary basis of gristly or cartilaginous kind. Ossification in this latter instance is therefore said to begin in carti-

lage, just as in the previous case it began in membrane. The process of ossification in cartilage exhibits activity at several distinct and marked points of its extent. These points are the active centres of bone-growth, and are hence called centres of ossification. The limy material is therefore diffused from these centres throughout the extent of cartilage, the blood-vessels of the adjoining parts bringing supplies of material from which the earthy matters are deposited within the cartilaginous basis. The corpuscles of the cartilage are seen to be arranged in vertical rows, and the calcareous matter, deposited in the form of granules, is thrown in around them. The nuclei of the cartilage cells are left unossified, a space also being kept free around each nucleus, which becomes one of the lacunæ or minute cavities seen in a microscopic section of bone-tissue. The first deposits of bony matter are of an irregular and thick description, this form of ossification, if persisted in, producing cancellated bony tissue; while by a subsequent process of absorption of the spaces in the cancellated tissue, and by the further deposition of bony matter, the irregular tissue is converted into compact bone. The gradual growth of bone takes place by a continual development of the cartilaginous basis between the various centres of ossification, and in this new basis earthy matter is as continually being formed.

Ossification may also occur abnormally in living textures, and as the result of diseased conditions. Deposits of limy matter thus take place within the coats of blood-vessels, rendering them friable and readily ruptured. The valves of the heart may become calcareous, and calcareous degeneration may even affect tumors and other products in themselves of abnormal nature. A distinction ought to be made between mere calcification as just indicated, and true ossification, or the formation of bone. But in either case the deposition of limy matter forms the basis or essential feature. The gall-bladder may thus be converted into a hard limy sac or bag, and even the pericardium or investing sac of the heart may occasionally exhibit a high degree of calcification. See BONE.

Ossining, ŏs'sĭn-ĭng, formerly **Sing Sing,** N. Y., village in Westchester County; on the Hudson River, and on the New York Central & Hudson River railroad; about 30 miles north of New York. It was settled about 1698, incorporated as a township 2 May 1845, and as a village some years later. The name Sing Sing, by which it was known until 1901, comes from an Indian word meaning a stony place. One of the State prisons is located here, just outside the village limits, and is known as Sing Sing prison; hence the villagers desired a change of name, and chose Ossining. The village, located upon rocky hills, overlooks Tappan Bay and a long and beautiful part of the river. In the early part of the 18th century silver, copper and some gold was found here, and considerable capital was expended in developing mines which never proved productive. The chief manufactures are shoes, leather, machinery, foundry products, pills, porous plasters, drills, and plated goods. The trade is chiefly in its own manufactures and farm products. Some of the places of interest are the Croton Aqueduct Arch, 88 feet span and 70 feet above water, and the arched highway bridge. The State prison, a large white building, made of dolomite, a coarse marble quarried nearby, was founded in 1826. Capt. Elam Lynds brought here 100 convicts from the State prison at Auburn and put them to work to wall themselves in. Men only are confined here. The village has long been noted for its educational institutions; it has Holbrook, Saint John's, and Mount Pleasant Military academies, Ossining Seminary for young women, public and parish schools, and a public library. There are six churches. The two banks have a combined capital of $200,000. The government is vested in a president and nine trustees. The president and three trustees are elected each year. The village owns the waterworks. Pop. (1900) 7,939. Consult: Ingersoll, 'Hudson River and Catskill Mountains'; Scharf, 'History of Westchester County.'

M. MORAN,
Editor 'Democratic Register.'

Ossoli, ŏs'sō-lē, **Sarah Margaret Fuller,** MARCHIONESS, American writer: b. Cambridgeport, Mass., 23 May 1810; d. off Fire Island beach 16 July 1850. She was remarkable for her precocity and her association with Emerson and other eminent literary men, rather than for her own productions. She was taught at six to read Latin, and early made herself acquainted with English and continental literature. She taught in public and private schools in Boston and Providence, and frequently visited Brook Farm (q.v.), though she never resided there, and had no confidence in the final success of that enthusiastic experiment. In 1840–2 she was editor of the 'Dial,' which numbered Emerson and other distinguished writers among its contributors. In 1844 she removed to New York, and became literary critic of the *Tribune.* In that capacity she worked effectively toward the increase of public interest and the improvement of public taste in literary, artistic, and other matters. She visited Europe in 1846, met there leaders in literature, art, and philanthropy, married in 1847 the Marquis d'Ossoli; was in Rome during the siege of 1849, when she served in the hospitals; embarked with her husband for New York, but perished almost in sight of port during a severe storm. The position she took in the American literary world of the time would perhaps be not wholly intelligible to one now reading much of what she wrote. Her critical articles are her best by far, many being brilliant and exhibiting what Higginson calls "the power of putting a high thought into a sentence." She sought to abolish the colonial spirit in American thought and letters, and contemporaries bear witness to the reality and excellence of the service. Consult the 'Memoirs' by Emerson, Clark, and Channing (W. H.) (1852); and the biographies by Howe (1883); and Higginson (1884) 'American Men of Letters' series.

Ossuna, ō-soo'nā, **Duke of.** See OSUNA, PEDRO TELLEZ Y GIRON, DUKE OF.

Ostade, ŏs'tä-dĕ, **Adrian van,** Flemish painter: b. Haarlem December 1610; d. there 2 May 1865. He studied under Frans Hals. His pictures exhibit an exact imitation of nature, and contain realistic representations of subjects which in other hands would have been mean or commonplace, such as the interiors of ale houses or kitchens, with Dutch peasants smoking,

quarreling, or drinking, and he puts such expressions into the heads of his characters that their coarseness is lost in our admiration of their truth and animation. His coloring is rich and clear, his touch spirited and free, and all his works are highly finished. He was also a good etcher. Among his pictures (which are generally small) may be mentioned 'The Smoker'; 'The Drinker'; 'The Dancer.' He also painted many portraits.

Ostade, Isack van, brother and pupil of the preceding, Flemish painter: b. Haarlem 2 June 1621; d. there 16 Oct. 1649. He at first applied himself to paint the same subjects as those which had brought such a brilliant reputation to his brother, but soon abandoned taverns and kitchens for scenes in the open air, both summer and winter landscapes, and with such success that at the time of his death at 36 he was rapidly rising to be a rival to his brother. Original in style, his pictures are remarkable for good composition, masterly drawing and solid painting. Most of them are in England, where they were valued before his fellow countrymen came to a knowledge of his genius. Among the most valued of them are: 'A Village Inn'; 'View of a Frozen Canal'; 'Landscape and Cottages'; 'Village Scene' (showing cavalier on gray horse, horsemen with red cloak and post wagon); 'Winter Landscape in Holland.' The 'Halte de Voyageurs' and 'Vue de Village' were sold (1865) for upward of $5,000 each.

Ostei'tis, inflammation of the substance of bone. In its chronic forms it may result in suppuration; in caries, a decay of the bone in particles; or in necrosis, a decay of the bone in slices. In acute cases low diet, aperients, leeches, etc., are employed; but in chronic cases, tonics, good air, and possibly removal of the diseased bone may be required.

Ostend, ŏs-tĕnd', Belgium, a seaport town and pleasure resort, in the province of West Flanders, on the North Sea, 67 miles northwest of Brussels. Ostend is connected by rail with all parts of Belgium, France, and Germany; and steamers ply regularly to and fro from London and Dover. It was strongly fortified prior to 1865, since when the fortifications have been replaced by fine promenades. It has a healthful situation, although on a low sandy coast, and is resorted to for sea bathing, etc., by about 50,000 visitors annually. Along the sea front is a massive digue or esplanade of stone and terra-cotta, three miles long, forming a fine promenade. The public buildings include the Hotel de Ville, three churches (one finished in 1883), an English church, large Kursaal, barracks, etc. The harbor is not easy of access, but has been greatly improved since 1898; the basins within are extensive, and form the termination of a magnificent line of canals stretching like a network into the interior, and furnishing admirable facilities for commerce. The manufactures are unimportant, the chief being linen, sail cloth, and tobacco. Shipbuilding is also carried on. Cod and herring fishing are considerable industries, and an important branch of trade is oysters, fattened here in large salt reservoirs, and transported as far as Paris. Ostend was founded in the 9th century, walled in 1445, and regularly fortified in 1585 by the Prince of Orange. In the great struggle to throw off the yoke of Spain it sustained a memorable siege from 4 July 1601 to 28 Sept. 1604, during which the besieged lost about 50,000 men, and the Spanish besiegers more than 80,000. Pop. (1900) 39,541.

Ostend Manifesto, The, a term used in the diplomatic history of the United States since 1854. In that year, 9 October, a despatch was forwarded to the United States government by the American ministers at the courts of Great Britain, France, and Spain, who had met in the city of Ostend, by the government's request, to discuss the Cuban question. The despatch declared that, if Spain would not sell Cuba, self-preservation required the United States to take the island by force, and prevent it from being Africanized like Haiti. The suggestion was not approved in the United States by statesmen or politicians and was strongly condemned.

Osteol'epis, a genus of fossil long, slender crossopterygian fishes, peculiar to the Lower Old Red Sandstone of Scotland. It is characterized by smooth rhomboidal scales, by numerous sharply pointed teeth, and by having the two dorsal and anal fins alternating with each other. This, with *Diplopterus*, etc., constitutes the family *Osteolepidæ*, represented in America by the genus *Megalichthys* of Carboniferous and Permian formations.

Os"teomala'cia (also called MALACOSTEON and MOLLITIES OSSIUM), a disease occurring most frequently in women, but sometimes in men, characterized by softening of the bones through progressive disappearance of the earthy salts. It affects the different parts of the skeleton, and deformities are often caused by it. It is mainly confined to adults, does not ordinarily attack the aged, and among women is likely to be associated with pregnancy, or to follow childbearing, abstention from which affected women should strictly practise. It may progress for years, and then end in fatal complication with lung disease, or through exhaustion. The causes assigned are many, but their determination is as yet incomplete. Surgery has sometimes proved more efficacious than medical treatment in this disease, which demands the most thorough hygienic care in all cases.

Osteol'ogy, that branch of anatomy which treats of bone or of bones. The bony element of the body is for the maintenance of form and motion, support of weight and muscles, and the protection of the internal organs. It is one of the hardest structures of the body, possessing a certain degree of toughness and elasticity. (See BONE.)

Development of Bone.— In the fœtal skeleton the long bones of the limbs are cartilaginous. Hence there are two kinds of ossification, intracartilaginous and intramembranous, and to those must be added the subperiosteal. In intracartilaginous ossification the cartilage-cells increase rapidly in number and arrange themselves in rows, the cells being closely packed and wedged together. The intracellular matrix of the cartilage is semi-transparent. Lying below this cartilaginous layer near the centre of ossification is a layer composed of osteoblasts. The intramembranous ossification is that by which the bones of the vertex of the skull are entirely formed.

Marrow.— The marrow differs in composition at different periods of life and in different bones. In the young it is a transparent reddish fluid of tenacious consistency, free from fat, and contains minute roundish cells. In the shafts of the adult long bone the marrow is of a yellow color and contains a large quantity of fat and areolar tissue. In the flat and short bones, in the articular ends of the long bones, in the bodies of the vertebræ, in the base of the cranium, in the sternum and ribs, it is of a red color, consisting of albumen and extractive matter with a mere trace of fat.

Nourishment of Bone.— This is derived from the numerous blood-vessels and lymphatic glands. Those of the compact tissue are derived from a dense network of vessels ramifying in the periosteum. From this membrane vessels pass into the minute orifices of the compact tissue.

Bones of the Human Body.— The skeleton of the adult consists of 200 distinct bones. The spine proper or vertebral column, includes 26; the cranium, 8; the face, 14; osphyoides, sternum, and ribs, 26; upper extremity, 64; lower extremity, 62.

Long, Short, Flat, and Irregular Bones.—The long bones, found in the limbs, are built to sustain the weight of the trunk and confer the power of locomotion. A long bone consists of a lengthened cylinder, a shaft with two extremities. The shaft is a hollow cylinder, the walls consisting of a dense compact tissue of great thickness. They are the humerus of the arm, radius and ulna of the forearm, carpus, metacarpus, and phalanges of the hand; the femur of the thigh; tibia and fibula of the leg; tarsus, metatarsus, and phalanges of the foot. Where a part of the skeleton is intended for strength and compactness and its motion is at the same time slight and limited, it is divided into a number of small pieces united together by ligaments. The separate bones are short and compressed, as, for example, the bones of the carpus and tarsus. These bones in their structure are spongy throughout except at their surface, where there is a thin crust of compact tissue. Where the principal requirement is either extensive protection or the provision of broad surfaces for muscular attachment, the osseous structure is expanded into broad, flat plates, as seen in the bones of the head, pelvis, foot, and hand. The irregular or mixed bones are such as from their peculiar form cannot be grouped under the preceding heads. They are the vertebræ, sacrum, coccyx, temporal, and sphenoid.

The spine is a flexuous and flexible column formed of a series of bones called vertebræ. They are 33 in number exclusive of those which go to form the skull, and have received the names cervical, dorsal, lumbar, sacral, and coccygeal, according to the position they occupy; seven cervical, twelve dorsal, five lumbar, five sacral, and four coccygeal. The sacral and coccygeal vertebræ consist at an early period of life of nine separate pieces, which are united in the adult, so as to form two distinct bones, the sacrum and the coccyx. Each vertebra consists of two essential parts, an interior solid segment or body, and a posterior segment or arch. The bodies of the vertebræ are piled one upon the other, forming a strong pillar, for the support of the cranium and trunk, the arches forming a hollow cylinder behind for the protection of the spinal cord. The different vertebræ are connected together by means of the articular processes and the intervertebral cartilages, while the transverse and spinous processes form levers for the attachment of muscles. Between each pair of vertebræ apertures exist through which the spinal nerves pass from the cord. The peculiar vertebræ of the cervical are the atlas and axis modified from the other vertebræ to admit of the nodding and rotary movement of the head. The atlas supports the globe of the head, the axis forming a pivot upon which the head is rotated. To the atlas and axis are attached the muscles of the neck and spine.

The large triangular bone situated at the base of the vertebral column at the upper and back part of the pelvic cavity is called the sacrum (q.v.).

The coccyx, the extreme end of the spinal column, in shape resembles a cuckoo's beak. It is formed of four small rudimentary vertebræ. It articulates with the sacrum and is attached to the levator and sphincter-ani muscles, the gluteus maximus, and the coccygeus muscles.

The superior expansion of the vertebral column is called the skull, and includes the cranium and the face. (See SKULL.)

The hyoid bone is named from its resemblance to the Greek, upsilon. It is called the lingual bone because it supports the tongue. To it are attached the muscles of the throat.

The sternum is a flat narrow bone situated on the median line of the front of the chest, and to it are attached some of the muscles of the chest and abdomen, articulating with the clavicles and seven costal cartilages.

The ribs are elastic arches of bone which, with the intercostal muscle, form the thorax. They are 12 in number on each side. The first seven are connected behind with the spine, and in front with the sternum through the intervention of the costal cartilages. The remaining five are called false ribs. To the ribs are attached the muscles of the chest, abdomen, throat, back, and diaphragm.

The anterior portion is called the clavicle, or collar-bone. (See CLAVICLE.)

The scapula forms the back part of the shoulder. It is a large flat bone triangular in shape, situated at the posterior aspect and side of the thorax between the first and eighth ribs. To it are attached the muscles of the shoulder, arm, and thorax.

The humerus is the longest bone of the upper extremity. It consists of a shaft and two extremities, articulating above with the scapula and below with the ulna and radius. To it are attached the muscles of the arm, forearm, and thorax.

The ulna is a long bone placed at the inner side of the forearm parallel with the radius and with it articulating with the humerus, forming the elbow-joint.

The radius is situated at the inner side of the forearm parallel with the ulna, with which it articulates, forming at its lower end the wrist-joint. The ulna and radius form the attachment for nearly all the muscles of the arm, hand, and fingers. (See ARM.)

The hand is subdivided into three segments, the carpus or wrist, the metacarpus or

palm, and the phalanges or fingers. (See HAND.)

The os innominatum, or hip-bone, forms the side of the pelvic cavity. It is divided into three portions, the ilium, ischium, and pubes. It articulates with its fellow of the opposite side, the sacrum and the femur. It forms the attachment of the muscles of the thigh, abdomen, and pelvis.

The longest bone in the skeleton, to which are attached the muscles of the leg and thigh, is the femur (q.v.).

The patella (q.v.) protects the front of the knee-joint and increases the leverage of the quadriceps extensor muscle. The tibia, situated at the front and inner side of the leg, beginning at the knee, is long and narrow, with enlarged extremities, articulating with the femur, fibula, and astragalus. The fibula is situated at the outer side of the leg, is smaller than the tibia, and forms with it the attachment of the muscles of the leg and foot. The bones of the foot consist of three divisions, the tarsus, metatarsus, and phalanges. (See FOOT.)

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Os"teomyeli'tis, inflammation of the inner lining membrane (endosteum) and the marrow-cavity of bone, a disease of rare occurrence, mostly following amputations. It also follows wounds whereby the medullary canal is exposed to the air, such as gunshot wounds, compound fracture, etc. The inflammation is due to pyogenic infection, is generally acute, and extends from the marrow to the osseous structure itself. Chills, sweats, and high fever sometimes accompany the usual symptoms of pain and swelling, with a purulent discharge appear sloughs of tissue and dead bone. In children an acute form of osteomyelitis is sometimes seen which it is often difficult to distinguish from rheumatism. Surgery alone is practicable in the direct treatment, with such medical and hygenic accessories as the physician may prescribe.

Osteopathy, a method of treating diseases without drugs, which relies upon the intrinsic powers of the body, where these are made free to act according to their specific constitution, by means of the mechanical engineering of the living machine in its affected parts, and their restoration to the normal condition, relation, and action. Its essential point of departure from the chemical method is the biological postulate that the sole and sufficient remedies for the cure of disease are within the body, and that these may be made operative by anatomical adjustment. It holds that the drug-method is merely external, prescriptive, and regulative, an empiric form imposed upon the content or life-processes of the body; that all cure must be intracorporeal, without imposition of an external form on the concrete processes of life. This brings therapeutics upon the plane of biology rather than of chemistry. It establishes a biosis, which is of the essence of growth, repair, and cure. If disease be considered as maladjustment to environment through defective action and reaction in the bodily mechanism, then cure would necessitate a detection and correction of such structural defect. There is a provision within the organism by which it may rise superior both to heredity and environment, until it meets and masters the conditions of its environment. This provision is selective adaptation.

By osteopathy the old postulate of evolution that life is a struggle because it proceeds from a poverty of resources, and that, consequently, only the fit may survive before the insurgent pressure of environment, is set aside, and a new induction, discovered from an investigation of the life-processes, is enthroned in its place, and the contention is made that life is a progress due to a surplus of supplies, and that the unfit do survive when made free to act in possession of their own constitutional endowments in relation to any habitable environment. This biological position makes clear a line of demarcation between osteopathy and all the accustomed theories of medicine. It emphasizes the following principles as of paramount import in the study of each and every part and power of the body: (1) Its organizing design; (2) its elemental potentiality; (3) its structural integrity; (4) its functional activity; (5) its mechanical adaptability; (6) its readjustive and restorative possibilities.

Osteopathy posits its entire claim to rationality and efficiency upon its philosophy. It is a critique of chemical medicine, maintaining that its principles, pharmacopœia, and practice are foreign to the body and antagonistic to its own processes. Not only is osteopathy biological, but its philosophy is teleological. It rehabilitates the philosophy of design that was set aside by the assumptions of materialistic evolution, and lets nature speak and act for itself under the categories of a theistic evolution. Osteopathy co-operates with nature in given cases of deformation, as in disease, by manipulating her own mechanisms and the sources of supply without extraneous chemical aid. The powers of bioplasm, cell, tissue, organ, and system, in their myriad transmutations and differentiations in the human body, are minutely and exhaustively studied and pressed into service in relation to the complex laws of stimulation, action, and reaction; just as the inventor of locomotives calculates the tensile strength of iron, brass, copper, steel, and other materials, and fits each pipe, crank, and wheel to its intended function. Osteopathy postulates life as its basal principle, out from which all organization and structure proceed. There are certain inner actions which are superior to and sovereign over all reactions and constitute the essential impulses and initial conditions of all growth, repair, and cure. These inner actions constitute the substance of life, while the adjustments of these actions constitute the forms of life. Neither forms nor substance can be supplied *ab extra* to the body. Osteopathy takes both its materials and its methods from life itself. Its processes and its products are internal and constitutive, while the materials and methods, the processes and products of all chemical medicine are arbitrary, external, and prescriptive. Osteopathy reasons that all organized bodies exist as such by virtue of a final cause; that purpose rules as a law governing all facts in organic nature; that in organized bodies nothing is in vain. In virtue of this, osteopathy conceives animals and plants as subject to disease; for disease takes place when the parts do not fully answer their purpose, when they do not do what they were made to do and ought to do. Osteopathy reasons that if a structure is made and endowed to do a spe-

cific work, and this structure may be known as capable of doing it, if it has ever done it under any conditions, and it does not do this work under a change of conditions, and these conditions are known, and the degree of defection from its proposed work may be diagnosed, the question only remains, Can the structure be made to do the work it was constructed to do, and may the conditions marking its failure be controlled to the end of restoring the original and specified functions? This question, osteopathy contends, is not settled by a formula of chemistry or a prescriptive or legislative jurisdiction, but is one purely judicial and executive, interpreting the meaning of the organism or structure, and eliciting its own operation. It is not competent to make a law alien to its constitution and enforce it upon the organism contrary to its own spontaneity, however plastic it may be in a crippled condition; but rational and scientific procedure would dictate that the law already there be revived and set into operation by adjustment of the oppugnant difficulties.

The cause of the particular mode of existence of each part of a living body resides in the whole, and presides over the whole, while in dead masses each part contains the cause within itself. This explains why a mere part separated from an organized whole generally does not continue to live; why, in fact, an organized body appears to be one and indivisible. Continuity and contiguity of relation of each and every part of the body, or a complete correlation of all the parts, is the prime condition of continuity and harmony of action. Every element of the body, even the most infinitesimal, exists and acts according to an established norm, and the whole body, being the sum of all the parts, realizes a full and finished ideal only when the norm of each is fulfilled in correlation with all the others. The method of procedure in osteopathy therefore is the procedure of nature, and its power as a therapeutic agency is based upon its knowledge and skill in the modes of nature's operations. The discovery and application of osteopathic ideas is coeval with the great discoveries of physics, chemistry, biology, and physiology. Indeed osteopathy is the rigid and scientific application of biology and physiology directly to the problems of pathology and therapeutics. It is also an application of anatomical mechanics. It emphasizes the anatomical ideas and utilities. The mechanical contrivances most conspicuous in man constitute the chief study of osteopathy, together with the purpose of their being and the normal laws of their action. This places osteopathy abreast of all the searching investigations into present physics, chemistry, and biology. Osteopathy seeks, with crucible, reagent, and dynamometer, to resolve all things in the body into a unity of substance and of force, and by the laws of its own constitutional action to establish its true relation to heredity, habitat, and habit. The whole body must gravitate or have weight, without which it could neither stand securely nor exert its powers on the bodies around it. But for this, muscular power itself and all the appliances which are related to that power would be useless. As the body must have weight to have power, so must it have a skeleton, in which also are the most admirable and remarkable adjustments and adaptations.

From the lowest form of organized living substance — bioplasm — to the fullest and firmest tissue — bone — osteopathy investigates, studies, and reasons. Form, structure, functions, relations, and purpose are the categories of its science, and as every science should take its differentiating principle, and even its name, from the essential body of its facts, so osteopathy takes the bones as its essential and nominal factor. The bones constitute the framework of the body. They give it location, position, locomotion, resistance, form, relation, action. Every other tissue is so related to the bones that their position and action depend on them. The bones are landmarks by which all explorations may be made. They constitute a system of movable architecture, by which all other parts, from the most fluid to the most fixed, may move or may be moved. Every other tissue, in its position, composition, action, and destination, stands related to and dependent upon the right relation and action of the bones. The bones are not merely architectural, but architectonic. The bones give structural unity, the union of all the parts of the body which springs from the principles upon which the body depends. The bones supply the mechanical basis which secures to all the other tissues their orderly functions. The name osteopathy is therefore scientific and significant. It is descriptive of the science, and embodies the master idea of the science, as it does also of the bodily structure. Having ascertained the form and law and power and purpose of the organic bases of the body, having viewed these in their relations as a whole, having seen how these relations are discharged in the united action of the body, and having embodied all these in its name, osteopathy proceeds to the great questions: Is the law of life and disease and death within the body or without it? Shall the law of the organism dominate the law of environment or be dominated by it? Shall the body assimilate the world to itself, or be assimilated to the world? Is the principle of initiation and spontaneity superior to the state of passivity, reaction, and plasticity? Is the body a product to be reacted upon by the formulations of the apothecary, or a process capable of action through its own potencies? If the body is autotoxic and may produce within itself worse pathological conditions than can be produced without it, is it not also autotonic, and may it not reduce these pathological conditions? If the body is autobiological and autochemical, and can produce better formulations within its own laboratories than can be made in the commercial laboratories, why may not the body be autotherapeutic? If there are conditions of self-sufficient production, why may there not be conditions of self-sufficient reduction in all the processes that tend to disease or health? If the body in a state of health is *de facto et in re* a biogen, and with a change of condition may become a pathogen, as in typhoid infection, and in turn may reconvert to a biogen under a reversal of conditions, why may not the sciences of pathology and bacteriology be considered merely as abnormal physiology, and pathogenic micro-organisms be perverted biologic entities? If design and purpose dominate function, and function determines structure, what is the one and only thing to be done? If purpose abides as an unchanging factor, then the only thing to

be done is to manipulate structure in order to the maintenance of function.

So osteopathy holds that structural integrity is the one condition of functional activity. The four factors to be considered are: (1) Function or purpose; (2) power as the efficient agent; (3) mechanism, by which power is expressed; (4) manipulation, by which the mechanism expresses its power in proper action. Physiological chemistry constitutes one of the most important of osteopathic disciplines, but osteopathy defines this organic chemistry as the chemistry which the living organs make, and not the chemistry that makes living organs. There is no such chemistry. There is therefore nothing in the chemistry of drugs that can initiate, imitate, supplement, or supplant, aid, keep, or rightly stimulate the life of the body or any of the life-processes. Such chemistry is dead; it not only cannot cure, but it is contrary to the law of cure. This is confessed both in the formula of allopathy and that of homœopathy. The *contraria contrariis curantur* of the one means, Give a poison contrary to the physiological condition of the body. The *similia similibus curantur* of the other means, Give a poison similar to the pathological condition of the body. Both are contrary to the body. Osteopathy works concordantly with nature. As disease is produced in the circle of the natural working of the body, it must be reduced in the same circle. There is unity of substance and force both in health and disease, and this is the unity of nature; so cure must be effected by that which is natural to all the conditions; and therefore osteopathy says *naturæ naturis curantur.*

Osteopathy develops its science into the etiology and symptomatology of disease, and shows how these stand related to anatomical integrity and adjustive manipulation. It reasons that a normal flow of blood is health, for the life is the blood; that any obstruction to such a flow is possible disease; that removal of such obstruction is scientific cure. It studies the blood under the conditions of normal flow, obstruction, congestion, chemical change and toxæmia, infiltration, inflammation, suppuration, absorption, and resolution. The motor mechanism of the body is studied under musculature, and this is viewed under the conditions of excitability, extensibility, contractility, elasticity, tonicity, rhythmicality, resistibility, flaccidity, rigidity, clonus, and tetanus. The power is studied as related to the brain and nerves, and these are possessed with receptivity, conductivity, acceleration, inhibition, reorganization, redistribution, modification, transmutation, and intensification. As to direction and function nerves are classified as afferent, efferent, electrical, chemical, trophic, motor, and sensory. Nerve-ganglia and plexuses and centres are aggregations of nerve-elements, and have all the powers resident in the body. These centres are subsidiary to the brain (q.v.), and communicate with it by means of three systems, the cranial, the spinal, and the sympathetic. Each organ and tissue is controlled by these systems. Osteopathy holds that the entire body, in its blood, muscle, and nerve systems, will act according to its design when free from obstructions. It has found that structural integrity is the one condition of functional activity, and that any obstruction to any force or fluid of the body constitutes the typical lesion that precipitates disease. These lesions may be osseous, ligamentous, muscular, or nervous. Such lesions are due to the compressions, concussions, contortions, compactures, contusions, congestions, constrictures, contractures to which the body in a gravitational world is constantly subjected. The detection of these lesions is made by a trained tactation (*tactus eruditus*) and a careful anatomical, physical, and (when necessary) microscopical and chemical examination. The predisposing as well as the exciting cause is carefully sought, and the causal conditions are considered more important than the resultant symptoms. These lesions are corrected, and nature is made free to act according to the normal. The stimulation that osteopathy uses is primarily physiological or natural, without the aid of mechanical appliances, heat or cold, drugs or batteries, and yet it is strictly mechanical, thermal, chemical, and electrical. The rationale of this stimulation is illustrated in the following manner: (1) Everything in the body moves or may be moved through the leverages of the bones and other movable structures — this is osteopathic mechanics and provides a wide range and variety of mechanical stimulation; (2) all motion, molar or molecular, liberates heat in proportion to mass and degree of motion — this is thermal stimulation; (3) all heat is a chemical action — this gives great scope of chemical stimulation; (4) the action of nerve on muscle is electrical — osteopathy holds to the electrical interpretation of physiological phenomena. It eschews the use of batteries and radio-activity upon living tissues, for the reason that these agents result in electrolysis, and this is biolysis. For the same reason it rejects chemicals as proper agents, because the result is chemolysis. Osteopathy holds to bionomy, autonomy, and automaty in all the resources of cure, and in a physiological sense osteopathy is autopathy. When necessary, it uses the customary non-chemical aids, such as packs, stupes, fomentations, etc., and in emergencies, when the organism is in imminent danger or intolerable pain, it would invoke the use of antidotes, anæsthetics, and antiseptics, though this would be exceptional. Osteopathy is scientific chirurgics. It is adjustive, fixative, manipulative surgery, and when incisions and excisions are necessary it proceeds in the usual way of operative surgery, though its methods make the use of the knife unnecessary in most cases.

Osteopathy would expound and apply the true philosophy of manipulation. While the hands are used, it is not this alone and chiefly that distinguishes its method of operation, but the idea and purpose that lie behind the manipulation. The end is production, and yet even this is not aimless and tentative, but definite and calculable. That is to say, the operator works to produce specific results, and holds that this production is a matter of law. An osteopathic operation is fundamental and actual production, and this production is according to known and demonstrated laws, and manipulation is the method by which these laws become evident and effective. Its intelligence consists in its perception of a new relativity between power and function. Osteopathy discovered (1) a simple fact or general law of power; (2) a correlated fact or specialized law of production; (3) an adapted mechanism through which the power

produces the desired result of health; (4) the process of manipulation, by which the mechanism is fitted to the power to produce the conditions of cure. All progress is made by realizing the relativities between power and function, and manipulating the factors. In the animal realm, as in lower realms, the most potent forces are manipulated; that is, the law of production operates in changing both forms and functions. The trainer of animals demonstrates this. His methods are manipulative, and his results are marvelous. New functions are developed from the old powers, and so great is the production that specific changes which are permanent and transmissible are secured. This is the law in the breeding of animals. The consummations of both science and art are reached through the laws of productive manipulation. The artists who realize their ideals and become masters in music, painting, song, oratory, literature, have specialized power, and they put it to use — this is function. They achieve the relation between them, and manipulate instruments, paints, voice, and language, and secure great ends. Then, too, men manipulate men. Youths are fitted — manipulated — for army, navy, bar, pulpit, politics. There is still loftier and more wonderful function which all may exercise in or upon the sphere of the higher nature — the task of transforming and reforming, that is, to all intents and purposes, truly forming each his own inward nature. This power seems greatest in overcoming an established habit. Anybody who breaks through a customary state or habit, already inwoven with the intimate fibres of his own life, is a man *par excellence.* All these processes demonstrate the powers and possibilities of productive manipulation. There is, therefore, known to us a power which can originate actions and functions, a clear spring of volitional creativeness, and manipulation is the scientific means of its arousal, development, and consummation.

Discovery of Osteopathy.— Andrew Taylor Still is the father and founder of osteopathy. He was a physician of the "old school." After many years of medical practice, including surgery, he became dissatisfied with the chemical methods, and having lost several children by meningitis, he began the study, experimentation, and investigation that resulted in the first announcement of his new method in 1875. For many years he practised osteopathy, limiting himself to dislocations, and at last, after great opposition and ridicule, he succeeded so conspicuously that a growing recognition was accorded him, and he founded a small class for its study. Soon it was seen that others could accomplish the same results, and large numbers flocked to Dr. Still when, in 1896, he projected a school. From a dozen or so, pupils soon increased to hundreds.

Institutions, Students, and Practitioners of Osteopathy.— The American School of Osteopathy and the A. T. Still Infirmary, at Kirksville, Mo., was incorporated in 1895, and a large corps of teachers and operators were installed to train and treat the crowds of students and patients. A year later the Northern Institute of Osteopathy was projected in Minneapolis, Minn., and then the Des Moines College, the Boston Institute, the Philadelphia College, the Southern, the California, the Colorado, and the Atlantic schools were established. These were all organized into a federation of colleges with a uniform curriculum. There are now over 3,000 pra_titioners in the field, with about 1,000 students in the colleges.

Legislation.— The first statutory recognition and regulation of osteopathy was made in Missouri in 1896, and the following States and Territories have laws regulating its practice: Alabama, Arizona, Arkansas, California, Connecticut, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Montana, Nebraska, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, Texas, Virginia, West Virginia, and Wisconsin.

Periodical Literature.— There are a score of periodicals devoted to the advancement of osteopathy, among them being the 'Journal of Osteopathy,' the 'Philadelphia Journal of Osteopathy,' the 'Cosmopolitan Osteopath,' the 'Journal of the American Osteopathic Association,' the 'Osteopathic World,' the 'Osteopathic Physician and Osteopathic Health,' the 'Boston Osteopath,' the 'California Osteopath,' and the 'Atlantic Journal of Osteopathy.'

The American Osteopathic Association and State Societies.— There is a national association that meets annually, made up of a select membership, representative of the profession, and which exercises oversight in all matters pertaining to the science and practice. There are also in most States subsidiary societies with the same objects. Consult: Pressly, 'Osteopathy as a Therapeutic Science'; Barber, 'Osteopathy Complete'; Davis, 'Osteopathy Illustrated'; Hulett, 'The Principles of Osteopathy'; Tasker, 'The Principles of Osteopathy'; Hazzard, 'The Practice of Osteopathy'; McConnell, 'The Practice of Osteopathy'; Still, 'The Philosophy of Osteopathy' and 'The Mechanical Principles and Philosophy of Osteopathy'; Littlejohn, 'The Science of Osteopathy' (honorary-medal address before the London Society of Sciences).

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Osteos'traci, fossil fishes. See OSTRACOPHORES.

Osterhaus, ŏs'tẽr-hows, **Peter Joseph,** German-American military officer: b. Coblenz, Germany, about 1820. He emigrated to the United States, where he settled at Saint Louis, and at the outbreak of the Civil War joined the Union army in which he was given rank as major of volunteers, subsequently attaining the rank of major-general and serving as chief of staff under Gen. Kirby Smith. He acted as United States consul at Lyons, France, after the War, but ultimately returned to Germany, where he engaged in manufacturing business.

Osterman, ŏs'tẽr-mạn, **Rosanna Dyer,** American philanthropist: b. Germany about 1816; d. in a steamboat casualty on the Mississippi 2 Feb. 1866. Her wide charity and unselfish character made her a unique figure in the annals of Southern womanhood. During the Civil War she was a daily visitor at the Galveston hospitals, giving of her bounty to every sufferer. The Osterman building in Galveston, a monument of her benevolence, was bequeathed by her to the poor of all creeds. At her death

the bulk of her large fortune went to Jewish and general causes.

Ostia, ŏs'tĭ-ạ, Italy, an ancient city, formerly the port of Rome, at the mouth of the Tiber, six miles from Rome by the Via Ostiensis. It was founded by Ancus Martius, who established salt-works at its site, which long continued to supply Rome and the neighborhood. Ostia also supplied Rome with corn from Sicily and Sardinia. It was not, however, till the wars with Carthage rendered it of importance as a naval station that it appears in history.

The decline of Ostia appears to have been due to the constant filling up of the river, from which its site is now two or three miles distant. Claudius constructed a new harbor with great labor about two miles north of Ostia, which communicated with it by a canal. It was called the Portus Augusti, and afterward, when enlarged by Trajan, the Portus Trajani. The new port became the seat of a town called Portus Ostiensis or simply Portus. It communicated directly with Rome, and soon began to encroach on the trade of Ostia, which, however, continued to flourish until its destruction by the Saracens in the 9th century. Its ruins are about half a mile below the modern village, founded by Gregory IV. in 830, and strongly fortified, which is now a place with about 1,000 inhabitants. The ruins of Portus are on the right bank of the Fiumicino, about two miles from the coast.

Modern excavations at both places have revealed a number of interesting remains of ancient public buildings, temples, shrines, and tombs.

Ostiaks, ŏs-tĭ-āks', a primitive Finnish race who dwell in the Siberian governments of Tobolsk and Tomsk. They consist of three tribes, distinguished from each other by customs and language. Their language, of which the dialects are numerous, is classed as a branch of the Samoiedic, a language of Turanian stock. At present their aggregate amount may be estimated at some 100,000. Of uncertain origin, though possibly Mongolian stock, are the Siberian Yenisei Ostiaks, on the Yenisei, between the Upper and Lower Tunguska. They speak an entirely different language from all the other Ostiaks, and for a long period have completely adopted Mongolian customs.

Os'tracism (Gr. *ostrakon,* shell), an ancient mode of judgment by which, according to the Athenian law, a citizen was consigned to banishment. It was not a punishment for any offense actually committed, but a precaution against the projects of personal ambition and the excessive growth of individual power and influence. When it was decided by the popular assembly and senate that a citizen should be banished, no name being mentioned in the preliminary discussion, the voting took place in the following manner:— A place in the *agora* was enclosed by barriers, with ten gates for the ten tribes. By these the voters entered and deposited their votes, written on a shell or piece of tile. The archons counted the votes, and the person against whom the majority was given, provided it amounted to more than 6,000 votes, was obliged to leave the city within ten days. The period of banishment was usually ten years. Ostracism did not include forfeiture of property. Among the distinguished persons ostracized were Themistocles, Aristides, and Cimon, son of Miltiades.

Ostraco'da, an order of *Entomostraca* (q.v.) or small *Crustacea,* in which the body is unsegmented and completely enclosed in a bivalve shell or carapace. The shell is attached to the body only on the dorsal side, where there is an elastic divaricating ligament whose action is opposed by an adductor muscle. When the valves are opened seven pairs of appendages are exposed. These are two pairs of antennæ, a pair of stout chewing mandibles, two pairs of maxillæ and two pairs of locomotory legs. All of these appendages except the mandibles are more or less concerned with swimming and creeping. Besides tactile organs there is a median eye and sometimes a pair of eyes. The sexes are always separate. Sometimes the eggs are carried within the female's shell, but usually are deposited on water plants. The young pass through a nauplius stage with three pairs of appendages, but are peculiar in the presence of a bivalve shell. Numerous species inhabit both fresh and salt waters and many are known in the fossil state. The most frequent are the species of the fresh-water genus *Cypris* (q.v.), lively little animals found in great numbers in ponds and aquaria. *Cypridina* is marine, and has the shell excavated in front to permit the passage of the very prominent antennæ. It has both paired and median eyes and a large heart. Consult Packard, 'Zoology' (1897).

Os"tracoder'mi, a suborder of plectognath fishes, according to the classification of Jordan (see ICHTHYOLOGY), composed of the trunk-fishes, puffers, porcupine-fishes, and their allies, which have the body "inclosed in a three-, four- or five-angled box or carapace, formed by polygonal bony scutes, firmly jointed at their edges," and are without a spinous dorsal fin.

This term has also been used as a synonym of Ostracophori (see OSTRACOPHORES).

Ostracoph'ores, a subclass of small fishes (*Ostracophori,* or *Ostracodermi*), composed of very early Palæozoic forms with persistent notochord, and endoskeleton not calcified; mandibles and arches for the paired fins are apparently absent. The exoskeleton was well developed, and the head and anterior portion of the trunk was usually covered with plates, which in many form solid and extensive shields, making the fish look much like a horse-shoe crab; indeed the remains of many were at first mistaken for those of crustaceans, arachnids, or even gigantic beetles. The mimicry of the contemporary eurypterids (see EURYPTERUS) was very close. Louis Agassiz first recognized them as fishes. None of these fossils exhibit the slightest trace of ordinary jaws, or of a segmented axial skeleton in the trunk, or arches for the support of paired limbs. The dermal armor is remarkable for the extent to which vascular spaces are developed in its middle layer; in the oldest and simplest forms no bone-cells have been found in any part of the armor. There is always a shield covering the top of the head, and usually another over the abdominal region; and opposed to the latter is a ventral armature which meets the dorsal plate at each side in an open suture. The tail seems always to have been flexible, though scaly in some species. The mouth, according to Wood-

ward, must have been on the ventral side, with the nasal sac or sacs just in front of it. The gill-pouches opened outwardly into a covered space communicating with the exterior by a posterior orifice. Eyes are distinct, and other cephalic organs, as ears, and a pineal eye may be inferred from impressions in the interior of the head-plates. Traquair regards late discoveries as showing some close relationship between ostracoderms and primitive sharks.

Four orders are recognized in the class. The oldest and simplest is the *Heterostraci,* represented by the family *Pteraspidæ,* whose species occur in various parts of the world in formations from the later Silurian and early Devonian Ages. The hard shield in these fishes, some of which were a foot in length, is formed of a few plates, well fused in the adult, each plate of which is unlike anything else in the *Chordata,* for it consists of three layers,—an inner or nacreous layer of lamellæ, a thicker middle layer of polygonal cancellæ, and an outer layer of dentine. Dermal sense-organs are well developed and arranged in canals within the middle layer, opening externally by a double series of pores. *Pteraspis* and *Cyathaspis* are well-known genera. Associated with this group by Traquair and Zittel-Eastman on later information, are the family *Cœlolepidæ,* formerly considered sharks; and the more familiar *Psammosteidæ,* which extend the range of the group into the Upper Devonian. A second order, *Anaspida,* consists of a few species ornamented outwardly with tubercles, but no armature of fused plates. The third order, *Aspidocephali,* or *Osteostraci,* consists of many forms found in the Upper Silurian and Lower Devonian, and especially in the Scotch Old Red Sandstone, which have a broad solid head-shield, consisting of three layers, the outer of hard vaso-dentine; the body of these fishes were covered with quadrangular scales; they had no paired appendages, but moved by means of a small dorsal fin and the heterocercal tail. This group is one of those most studied by Hugh Miller, Murchison, and other early geologists, and has been the object of special treatises by Huxley, Lankester, Brandt, etc. *Trematapis* is a genus representing an allied family.

A fourth order, *Antiarcha,* contains that remarkable form *Pterichthys* and allied genera of the family *Asterolepidæ.* These were small fishes of robust form, the head and forward parts heavily armed with large tuberculated plates united into a solid buckler by lateral plates. The hinder part of the body, small fleshy dorsal fin, set near the tail and the heterocercal tail itself are covered with small scales, except in the finny portions. The most extraordinary feature in this curious primitive fish were the paddle-like appendages, closely resembling in shape and action the flippers of a marine turtle, which were articulated by a complex joint just behind and beneath the corners of the mouth and were completely armored. They formed swimming organs prefiguring the pectoral fins of later fishes. These and their allies, *Asterolepis, Bothriolepis,* etc., are found in the Devonian rocks of both Europe and North America. Consult: Woodward, 'Vertebrate Paleontology' (1898); Zittel-Eastman, 'Text-book of Paleontology,' Part II. (1902); Traquair, 'Fossil Fishes . . . in the Silurian Rocks of the South of Scotland' (1899). See ICHTHYOLOGY.

Os'trich, a great African running-bird (*Struthio camelus*). The ostriches constitute a genus (*Struthio*) and a family (*Struthionidæ*), of the group Ratitæ (q.v.), characterized by having but two toes, the third and fourth, of which the former is much the larger, and bears a short hoof-like nail; an almost equally unique internal feature is the symphesis of the pubic bones. The ostrich is by far the largest of existing birds, attaining a height of seven to eight feet and a weight of 300 pounds, and was exceeded by only a few more or less closely related extinct ones. There are no true down feathers, but the contour-feathers are soft and lax, with free barbs and no aftershaft, and are distributed uniformly over the skin without any arrangement into pterylæ and apteria. On the body the plumage is black or blackish, with the quill plumes of the wings and tail white; the head and neck are nearly, and the legs quite, naked. The head is remarkably small for a bird, the eyes large and the beak flat; the horny covering of the latter is peculiar in being composed of several pieces separated by soft skin, instead of being continuous as in most birds. The gape is straight and reaches to a point beneath the eye. The absence of functional wings and tail, the elevated back, the stout, column-like legs with padded toes, the long, erect, curved neck and the great size, all combine to produce a very unbird-like aspect, and to give a peculiar appropriateness to the name "camel-bird," applied to the ostrich by old writers.

Formerly the ostrich was abundant throughout Africa and a great part of the southern half of Asia. In the latter region it is now restricted to a few of the more inaccessible deserts, and in Africa is no longer found in the wild state, in Egypt or near the northern and southern settlements, but is still abundant throughout the intervening territory wherever sufficiently extensive and solitary wastes exist. Some zoologists consider that but a single species ranges over this whole vast territory; others have distinguished three: *Struthio camelus* of northern Africa, *S. australis* of southern Africa, and *S. molybdophanes* of Somaliland. In the first the naked parts of the skin are pink, in the second bluish, and in the last lead-colored; the eggs of the first have a surface of ivory-like smoothness, in the other two they are pitted. Wherever abundant, ostriches live on the plains in association with zebras, hartebeestes, gnus, etc. Like these animals they are extremely alert and wary as well as timid. So fleet are they that even the Arab on his blooded steed can seldom overtake one single-handed, and even when hunted in relays, as the birds circle about their favorite territory, one or more horses are frequently sacrificed to the chase. When in full flight a full-grown ostrich is said to cover 25 feet at a stride. They are also captured for the sake of their plumes by means of pitfalls, shooting with poisoned arrows, and in other ways. During the breeding season they form family parties consisting of one male and several females. The latter deposit their eggs to the total number of fifty or sixty in a shallow depression surrounded by a slight rampart of earth. Many of the eggs are broken, some of

them to be devoured by the male, others to supply soft food to the young, so that the brood of young seldom exceeds twenty or thirty, many of which fall a prey to carnivorous animals. The male exclusively incubates at night, while during the day the females take turns in guarding the nest or incubating the eggs. During the breeding season the male protects his family faithfully and if driven to extremities fights viciously, kicking sideways or directly forward so powerfully that men and even horses are reported to have been killed by the blows. Although herbage is their chief food, everything edible is eaten, and their habit of swallowing every kind of hard object, just as other birds do gravel, to complete the grinding apparatus of the gizzard, has given to the digestive capacities of the ostrich a wholly undeserved notoriety. They are very fond of water and bathe when opportunities offer.

Domestication of the Ostrich.— Although the flesh is but little used, the eggs of the ostrich are much esteemed for food by native Africans, and their shells serve a useful purpose in the construction of vessels and implements. But it is their plumes which have given a mercantile value to ostriches from ancient times till now. To furnish a ready supply as the wild birds became scarcer in accessible regions, domestication has been resorted to. This is said to have been practised by native tribes for many years, and about the middle of the last century was begun by the French in Algiers and the English in Cape Colony. In the latter place there are said to be now upward of 300,000 domesticated ostriches, yielding an annual revenue of $5,000,000. Ostrich farming in the United States is still in its infancy, but promises to become an important industry. The first experimental importation of ostriches was made into California in 1882, and at the present time about 1,500 of these birds are to be found on the pioneer ostrich ranches of California, Arizona, Texas, and Florida. Large, level, grassy fields are enclosed by strong high fences, to form corrals in which the general flock runs. The breeding birds are separated in pairs or sets of one cock and two hens in smaller pens. A single pair will sometimes produce as many as 35 young. the average loss of which is as low as 10 per cent in California, but much higher in Arizona. By the removal of the eggs as soon as laid and rearing them in incubators the output is much increased. In Africa a single trio of birds has been known to produce 188 eggs, from which 133 young were raised in a single year. The chief sources of loss are injuries by the parent birds, cold, dry food, and in Africa an infectious disease. The newly hatched young are the size of a full-grown barnyard hen, and when well fed increase in height so rapidly that by the end of six months they nearly equal their parents. At first they are sheltered at night in brooding boxes, but are turned loose during the day to feed on green alfalfa or other succulent plants, which are, with an abundance of water, their nearly exclusive diet. Dry food is very likely to cause fatal digestive disturbances in the young. The old birds require but little care and are fed on any vegetable matter, but principally upon chopped beets, cabbage, oranges, and corn. The plumes from the wings and tails of the fully grown birds are the most valuable, and are cut or plucked once or twice a year, each bird yielding about $50 worth annually on the American ranches, but very much more than that on the African farms. When the American stock has become thoroughly acclimated this industry will probably yield rich returns, as some of the South African farms are reputed to pay 40 per cent net profit on the investment. Experiments in ostrich breeding are being tried in Mexico, Central and South America.

Consult: Mosenthal and Harting, 'Ostriches and Ostrich Farming' (1877); Martin, 'Home Life on an Ostrich Farm' (1891); Duncan, Report United States Department of Agriculture for 1888.

Ostrich Fern, a genus (*Matteuccia*) of ferns of the natural order *Polypodiaceæ*. The best known species (*M. Struthiopteris*), a native of Europe and eastern North America, has fertile fronds which resemble ostrich plumes; its sterile ones, which often attain a height of ten feet, form a handsome vase-like mass of foliage. It may be readily propagated from offsets and is one of the most easily cultivated native ferns. See also FERNS AND FERN-ALLIES.

Ostrogoths, ŏs'trō-gŏths, a people of the Gothic race who lived at a very early time in southern Russia. They were conquered by the Huns 375 A.D. In 479 they crossed the Alps into Italy and became incorporated with other nations.

Osuna, ō-soo'nä, **Pedro Tellez y Giron,** DUKE OF, Spanish soldier: b. Valladolid 1579; d. castle of Almaceda 1624. His caustic and satiric wit twice forced him to leave the Spanish court, to which he returned through the favor of the Duke of Lerma, after distinguishing himself in the Netherlands. He opposed the expulsion of the Moors, thus bringing upon himself the charge of religious infidelity. In Sicily, where he was viceroy 1611–15, and in Naples, where he held the same position 1616–20, he did much for the improvement of the common people, but was an enemy of the clergy in general and of the Inquisition in particular. He probably aimed to build up an Italian kingdom for himself, and in 1620 was recalled, arrested, subjected to a three years' secret trial, and imprisoned in the castle of Almaceda, where he poisoned himself.

Oswald, ŏz'wald, **Saint,** king of Bernicia, in Northumbria, England, from 634 to his death 5 Aug. 642. His father Ethelfrith had been one of the most powerful of the Saxon monarchs, but on his death the kingdom was overrun with invaders and Oswald his son was banished among the Scots in Ireland. Here he became converted to Christianity which he resolved should be the religion of his kingdom. In 636 he recovered the throne of Northumbria and requested the monks of Iona to send missionaries for the conversion of his pagan subjects. In response Aidan (q.v.) came with a band of clergymen and established himself as bishop in the island of Lindisfarne. In a few years the whole north of England was converted to the faith. Meanwhile Penda, king of Mercia, was persecuting the Christians, and at length declared war on Northumberland. A battle took place at Masetfelth, and Oswald was slain. Sub-

sequently the place was called Oswestry or Oswald's Cross, after this zealous and pious monarch, who, before the two armies joined battle, had set up a cross on the ground between them. His monument is still to be seen in Gloucester Cathedral where his relics had been deposited, and he was canonized as a king and martyr, his festival being celebrated 5 August. Consult Churton, 'History of the Early English Church.'

Oswald, Eleazer, American soldier and journalist: b. in England 1755; d. New York 30 Sept. 1795. He came to America in 1770 through sympathy with the patriot cause. In 1775, under Benedict Arnold, whose secretary he became, he served as captain at Ticonderoga and also at Quebec, where, Arnold being wounded, Oswald took command with great efficiency. In 1777 he rose to the rank of lieutenant-colonel. He engaged in the business of printing and publishing in Philadelphia and in New York, and politically was in violent opposition to Hamilton and the Federalists. He entered the French army, in which, at the battle of Jemappes, he commanded an artillery regiment. The French government sent him on a mission to Ireland, after performing which he returned to New York.

Oswald, Felix Leopold, American naturalist: b. Namur, Belgium, 6 Dec. 1845. He was graduated from the University of Brussels in 1865 and studied later at Göttingen and Heidelberg. He became a physician; but later abandoned the practice of medicine, came to the United States and devoted himself to natural history. He has published 'Summer-Land Sketches' (1880); 'Physical Education' (1882); 'The Secret of the East; or, The Origin of the Christian Religion' (1883); 'Days and Nights in the Tropics' (1887); 'The Bible of Nature'; 'Body and Mind'; 'Zoological Sketches'; etc.

Oswegatchie, ŏs-wē-găch'ĭ, **Fort,** a former French fortification near Ogdensburg, N. Y. It was also called Fort Preservation, and Fort La Gallette. In 1760 it was taken by the British and called Fort William Augustus.

Oswego, ŏs-wē'gō, Kan., city, county-seat of Labette County; on the Neosho River, and the Missouri, Kansas & T. and the Saint Louis & S. F. R.R.'s; 132 miles south-southeast of Topeka. The river furnishes excellent water-power, and there are a number of mills, including flour-mills. It is also the centre of a grain and live-stock region; and there is some coal in the vicinity. A public library is maintained by the Library Association. Pop. (1890) 2,574; (1900) 2,208.

Oswego, N. Y., city, port of entry, county-seat of Oswego County; on Lake Ontario at the mouth of the Oswego River, and at the northern terminus of the Oswego Canal. It is on the Delaware, Lackawanna & W., the New York, Ontario & W., and the New York Central & H. R. R.R.'s; about 35 miles north by west of Syracuse. Oswego was founded, in 1724, as a trading post and military station. It was incorporated as a village in 1828, and in 1848 was chartered as a city. It was one of the most important places on Lake Ontario and in wars which took place along the northern frontier it was always considered a vantage ground and its possession was contested. In the French and Indian war and King George's war, Colonel Mercer built here two forts, strong for the times, 1755. In August 1756, the place was captured by General Montcalm, who destroyed the forts. This capture of Oswego was considered one of the important events of the French and Indian war. About 30 men on each side were killed or wounded and 1,690 of the British were taken prisoners. Oswego was made the centre of the military operations along the lake and, in the year 1759, General Amherst started from this place, with a force of 10,000 men, for Quebec where Wolfe was in command. Oswego was the meeting place, in 1766, between Sir William Johnson and Pontiac, and at this meeting the latter submitted to the British. In the War of 1812 this place was again a disputed point. Its good harbor was always an attraction. On 6 May 1814 a British force attacked the place and captured it. After peace was restored, the place prospered and grew steadily as an important lake port and a shipping point for the products of the rich farms of the vicinity. When the West began to develop as a wheat country, and the grain was at first sent East to be manufactured into flour, Oswego was one of the chief points of manufacture and re-shipment. The grain elevators and flour mills were then prominent features along the river and canal. The opening of the flour-milling industry in the West, near the wheat-fields, deprived the city of its great industry, from which loss it did not recover for years. The excellent water-power was finally used for manufacturing other products, and the city has now (1904) a large starch factory, machine-shops for oil-well supplies, boiler and engine works, knitting mills, car spring works, match and cigar factories, shade cloth mills, and breweries. The lake trade has increased and the city exports manufactured goods, farm products and fruit. The harbor, with its outer and inner haven, which can accommodate large steamers, has been so improved that the quantities of coal, lumber, and grain brought here for re-shipment can be handled with great rapidity. The exports in 1903 were nearly $3,000,000 and the imports, nearly $700,000. The beautiful parks, the drives, especially near the lake and along the river, fine residences, and grounds, all make an attractive city. Some of the places of interest are the old Fort Oswego (q.v.), the present Fort Ontario which overlooks the harbor, the government building, the State Arsenal, the court-house, and city-hall. Oswego is noted for its State Normal and Training School, founded by Edward Austen Sheldon (q.v.). It has fine public and parish schools and the Gerrit Smith Library. The government is administered under a charter of 1896 which provides for a mayor, who holds office two years, and a council. The waterworks are owned and operated by the municipality. Pop. (1890) 21,842; (1900) 22,199.

Oswego, a river in New York, formed by the junction of the Oneida and Seneca rivers in the northern part of Onondaga County, and flowing north by west enters Lake Ontario at Oswego. It is 24 miles long and has a fall of 120 feet from its source to the lake. By means of a canal and locks, the river has been made navigable some distance from its mouth.

Oswego Bass, the small-mouthed black bass. See BASS.

Oswego, Fort, the name of the fort built by the French on the site of what is now the city of Oswego. Later Fort Ontario was built on the opposite side of the Oswego River. See OSWEGO.

Oswego Tea, a name given to several species of labiate plants of the mint-like genus *Monarda,* particularly *M. purpurea, M. didyma,* and *M. kalmiana,* natives of North America, because of the occasional use of an infusion of the dried leaves as a beverage. The infusion is said to be useful in intermittents and as a stomachic. Some other species of *Monardo* are used in the same way, and are not uncommonly cultivated in gardens for ornament, where they are sought by bees.

Osymandyas, ŏs-ĭ-măn'dĭ-ăs, Egyptian king, said by Greek writers to have reigned during the period between Menes and Mœris, and to have invaded Asia with a great army, penetrating as far as Bactriana. According to Diodorus, on his return he erected great works at Thebes, among which was a monument of unequaled magnificence, the Osymandeion, but this is supposed to be identical with the Ramesseum on the west bank of the Nile at Thebes, built by Rameses II., with whom, however, there is much difficulty in identifying Osymandyas himself, whose exploits appear to be mostly of a fabulous character. Consult: Diodorus, i. 47–9; Tzetzes, 'Chiliades' iii. 892; iv. 620; Budge, 'A History of Egypt' (1902).

Otago, ō-tä'gō, New Zealand, a southern provincial district of South Island, bounded west, south and east by the Pacific, and on the north by Canterbury and Westland. Area 25,487 square miles. The capital is Dunedin, other towns are Port Chalmers, Oamaru, Invercagill, etc. Otago was settled in 1848 by a body of Scotch Free Churchmen. Pop. (1901) 173,145. See NEW ZEALAND.

Otaheite, ō-tä-hē'tē or ō-tä'hē-tē, an island in the Pacific Ocean, now known as Tahiti. See TAHITI.

Otal'gia, earache; specifically neuralgia of the ear. Its attack is usually sudden, the pain coming on at once with full intensity. It is often associated with other ailments, of which it may be only a local symptom, and frequently arises from disorders of the teeth. Neuralgic pains in other parts of the face often follow it. When otalgia is very intense it extends to the temple and nerves on the same side of the face, in which it causes acute pains. It frequently departs suddenly, and returns again generally to the same ear. The treatment when the disease is symptomatic must depend upon the cause. Ordinarily earache is due, not to otalgia, but to otitis media (q.v.), or inflammation of the middle or tympanic portion of the ear.

Otaru, ō'tä-roo, Japan, the chief town on the west coast of Hokkaido on the south shore of Ishikari Bay, and connected by rail with Sapporo and the coal region of Ishikari. It has important herring and other fisheries and a large trade. Interesting archæological remains have been found in the vicinity. Pop. (1898) 56,961.

Otavalo, ōt-ä-vä'lō, Ecuador, town, province of Imbabura; 25 miles northeast of Quito. It was settled in 1534; in 1868 it was completely destroyed by an earthquake and many of the inhabitants were killed. Since then it has been well rebuilt, and has several mills manufacturing cotton and woolen goods. Pop. about 6,000.

Otchakoff, ŏ-chä'kŏf, Russia. See OCHAKOF.

O'tero, Miguel Antonio, American capitalist and politician: b. Saint Louis 17 Oct. 1859. He was educated at Saint Louis University and at Notre Dame University, Ind. From 1880–5 he was cashier of the San Miguel Bank of Las Vegas, N. Mex., and is director and official in several important companies. He has been clerk of San Miguel County, city treasurer of Las Vegas, and clerk of the United States district court for the 4th judicial district of New Mexico. In 1892 he was a delegate to the Republican National Convention; and in 1900 chairman of the Territory's delegation to the Convention. He was appointed governor of New Mexico in 1897, and re-appointed in 1901 for a term of three years.

Otero, Rafael, Cuban dramatist: b. Havana 1827; d. there 1876. His first comedy was performed so early as 1842. Several others were afterward presented at Matanzas and Havana, among them: 'El Coburgo,' 'Del Agua Mansa,' 'Mi Hijo el Francés,' and 'Un Novia del Dia.' He further wrote two works of fiction, 'La Perla de la Diaria' (1866) and 'Cantos Sociales' (1868). Much of what he wrote remains in the files of periodicals.

Otfried, ŏt'frēd, Alsatian theologian and poet: b. about 800; d. about 875. He was the author of one of the earliest specimens of composition in the German language. After having become a monk of the Abbey of Weissenburg, in Alsace, he studied under Rabanus Maurus, abbot of Fulda. He then returned to his monastery, where he opened a school of literature, and wrote a variety of works in prose and verse. The most important of these is a rhymed version or paraphrase of the Gospels in Old High German, still extant, in which there are some passages of lyrical poetry. He completed it about 868, and dedicated it to Ludwig, king of Germany. An edition of it was published by Piper in 1898, and modern German translations by Rapp (1858) and Kelle (1870).

Othello, ō-thĕl'ō, **The Moor of Venice, The Tragedy of,** a drama by Shakespeare which ranks with 'Hamlet,' 'Lear,' and 'Macbeth,' as one of the poet's four great masterpieces of tragedy. It was acted in 1604, printed in 1622 in a quarto edition, and was included in the First Folio of 1623. The source of the tragedy is the story entitled 'Un Capitano Moro' in Cinthio's 'Hecatommithi,' a collection of tales and novels printed in Italian in 1555. The 'Hecatommithi' appeared in French in 1684, but Shakespeare has followed the Italian version in its general outlines.

Othman, ŏth-măn', or **Osman I.,** surnamed GHAZI, "the Victorious," Turkish sultan, founder of the Ottoman or Osmanli empire, which was named after him: b. Sukut, Bithynia, 1259; d. 1326. In 1288 he succeeded his father Ertoghrul as chief of a Turkish horde in Phrygia, and in 1299, after successful campaigns which put the eastern part of Asia Minor in his hands, proclaimed his independence and took the title of sultan. Nicæa (1304), Marmora (1307) and Broussa (1326) came under his sway, and in his last years he made Karahissar his capital and

issued a regular coinage. He was succeeded by his son Orkhan.

Othman, or **Osman II.,** sultan of the Turks: b. 4 Nov. 1605; d. Constantinople 20 May 1622. The son of Ahmed I., in 1618 he came to the throne as 16th sultan and successor of his deposed uncle Mustapha I. He was defeated at Choczim (1621) by Sigismund III., king of Poland; attempted to suppress the Janizaries; but was captured by them and imprisoned. He was killed in prison by the grand vizier.

Othman Ibn Affan, third Moslem caliph: b. Mecca about 565; d. Medina 656. Mohammed's secretary and lieutenant, he married the Prophet's two daughters, and in 644 after the death of Omar was chosen caliph by the six appointed by Omar, of whom one actually wished Othman's election, each of the others pressing his own claims. Othman was then old and feeble, and not by nature over energetic in his prime, but he seems to have carried things with a high hand. He occupied Persia (645–7), eastern Africa, and Nubia (651), began the spread of Islam in the islands of the Mediterranean, dared remove from their offices the tried generals of Abu Bekr and Omar to make room for his kinsmen and favorites, and raised a storm of disapproval by sitting in the very seat of Mohammed instead of two steps below it, like his two predecessors. He attempted to introduce a definitive revision of the Koran. A great plot, embracing all his early rivals and the sectaries who differed with him, was formed; the Caliph was besieged, having broken his promise to appoint new governors, and was assassinated. His rule, though disturbed at home, was the beginning of the imperial growth of Islam, thanks to the conquest of Cyprus, Armenia, North Africa, etc.

Otho I., ō'thō (THE GREAT), emperor of Germany: b. 23 Nov. 912; d. 7 May 973. He was son of Henry I., and was crowned king of Germany at Aix-la-Chapelle in 936. His reign of 36 years was an almost uninterrupted succession of wars. After a 14 years' struggle he subdued Boleslav, duke of Bohemia; wrested the duchies of Swabia, Bavaria, and Lorraine from the Dukes of Bavaria and Franconia, and gave them (in 949) to his sons Ludolf and Henry, and to his son-in-law Conrad, count of Worms, respectively. He delivered the Italians from the oppressions of Berengar II., married the widow of Lothar, their first king, and was crowned king of Lombardy (951). In 961 he was crowned king of Italy, and in the next year emperor by Pope John XII. But shortly after John made an alliance with Adalbert, king of Upper Italy, to drive the Germans out. Otho, the following summer marched against Rome, drove John out, deposed him and placed Leo VIII. in the papal chair, though this proceeding is recognized as uncanonical and Leo is reckoned an anti-pope. The Byzantine court refused to acknowledge Otho's claim to the imperial dignity; but he defeated the Greek forces in Lower Italy, and the eastern emperor, John Zimisces, gave the Greek princess Theophania to Otho's son Otho in marriage. He was at once the greatest political and military power of the West.

Otho II., called DER ROTE ("The Red"), emperor of Germany: b. Rome 955; d. there 7 Dec. 983. He was the youngest son of Otho I. His elder brothers had all died before their father, who caused him to be crowned king of Rome (967), the first instance of the kind in German history. He assumed power in 973, and subdued the revolt of several powerful vassals, including his cousin, Henry II., duke of Bavaria. In Italy he suppressed a rising under Crescentius, and then attempted to drive the Greeks from Lower Italy; but they called in the aid of the Saracens from Sicily, and Otho suffered a total defeat near Cotrone, Calabria, 13 July 982. He died before fresh plans of conquest against Greeks and Arabians could be executed.

Otho III., called MIRABILIA MUNDI ("Wonder of the World"), emperor of Germany: b. July 980; d. 23 Jan. 1002. He was son of Otho II., and the last of the male branch of the Saxon imperial house. He was only three years old when he succeeded his father. In 996 he marched into Italy and crushed a fresh insurrection fomented by Crescentius. He was crowned emperor in 996 by Gregory V. He again crossed the Alps in 998 to suppress a second rebellion under Crescentius, whom he caused to be beheaded. On the death of Gregory, Otho raised his old tutor, Gerbert, to the pontificate as Sylvester II. Peace in Rome was, however, only temporary, and until his death Otho was mostly employed in quelling disturbances in various parts of Italy. Some historians assert that his death was due to poisoning, an act of revenge on the part of the widow of Crescentius. The emperor was a strict religionist, much given to penances and pilgrimages.

Otho IV., emperor of Germany: b. 1182; d. 19 May 1218. He was the son of Henry, Duke of Saxony. He was chosen by the Guelphs as rival king to Philip of Swabia in 1198, was recognized as sole king in 1208, and was crowned emperor at Rome 4 Oct. 1209. However, the emphasis which he placed upon imperial sovereignty in Italy displeased the Pope, who excommunicated him in 1210, and in 1212 declared Frederick II. the true king of Germany. He finally relinquished the struggle against Frederick and retired to his possessions in Brunswick.

Otho, or **Otto, I.,** king of Greece, second son of King Louis of Bavaria: b. Salzburg 1 June 1815; d. Bamberg 26 July 1867. He was educated at the University of Munich, was nominated king of Greece by the London Conference 7 May 1832, and chosen to this office by the Greek National Assembly 8 August. Until 1 June 1835 he was guided by a regency. Upon coming to his majority he showed himself too weak, too easily influenced by his Bavarian courtiers, and, above all, too much under Russian control to win the confidence of the people. Internal discord, financial difficulties, and open breaks with Great Britain and France followed, and 24 Oct. 1862 he was deposed by a provisional government, and returned to Bamberg. The only work of any importance that he accomplished for Greece was the organization of a system of education; a stronger man in his place would probably have profited by the repeated opportunities given Greece to acquire some territory of Turkey.

Otho, Marcus Salvius, Roman emperor: b. 32 A.D.; d. 69 A.D. He was for a time governor

of the province of Lusitania (Portugal) and joined Galba when the latter rebelled against Nero. On Galba's accession in 67 Otho became the royal favorite and was made consul; but when Galba appointed Piso as his successor, Otho, securing the allegiance of the pretorian guard, had Galba and Piso murdered, and was proclaimed emperor in 69. The eastern provinces acknowledged him as emperor, but in Germany Vitellius was proclaimed by the legions of the lower Rhine. Having led his army into Italy Vitellius overthrew, at Bebriacum, the forces of Otho, who killed himself after reigning three months and a few days.

O'tis, Bass, American artist: b. New England 1784; d. 1861. He first came into public notice as a portrait painter in New York, and nothing is known about his previous years of study. In 1812 he settled in Philadelphia where his only known genre picture, 'Interior of a Forge,' hangs in the Pennsylvania Academy of Fine Arts. His portraits include those of President Jefferson; Alexander Lawson; the painter Jarvis; and Dr. Physick. He has left a portrait of himself. Some of his works he reproduced in mezzotint.

Otis, Elisha Graves, American inventor: b. Halifax, Vt., 3 Aug. 1811; d. Yonkers, N. Y., 8 April 1861. He worked on a farm; was a carriage maker 1838–45; and was head of manufacturing concerns in Albany, Bergen Heights, N. J., and Yonkers. His great invention, that of a safety device for an elevator so that it can not fall even if the cable on which it is hung should break, was perfected for use in the last-named factory, and probably did more to increase the value of city real estate by making tall buildings possible than any other invention of the century. Otis also invented a special and independent engine for elevators, as well as a staple machine, a steam plow, a rotary oven, and a safety bridge, which although without a draw does not impede navigation. The great elevator business begun by him is carried on by his sons Charles Rollin and Norton Prentiss Otis.

Otis, Elwell Stephen, American soldier: b. Frederick, Md., 25 March 1838. He was graduated at Rochester University in 1858, and at Harvard Law School in 1861; volunteered in the Union Army in 1862 as captain of the 140th N. Y. Infantry, and took part in many battles in Virginia. Disabled for duty by a wound at Petersburg 1 Oct. 1864, he was discharged from the volunteer service with brevet rank of brigadier in 1865; in 1866 became lieutenant-colonel of the 22d Infantry; served in the West 1867–85, being organizer and head of the Leavenworth School of Infantry and Cavalry from 1881 to 1885. He commanded at Assiniboine, Mont., 1885–90; from 1890 to 1893 was superintendent of the recruiting service, his rank in the latter year being full brigadier; and, after commanding the Department of the Columbia 1894–7 and the Department of the Pacific 1897–8, was appointed commander of the United States forces in the Philippines and military governor. He was a member of the Philippine Commission 1899. In May 1900 he retired from the governorship of the Philippines; in June was promoted major-general; and in October became commander of the Department of the Lakes; a post which he held until his retirement from active service in March 1902.

Otis, Fessenden Nott, American surgeon: b. Ballston Spa, N. Y., 6 May 1825; d. 24 May 1900. He was graduated from the New York Medical College in 1852; was surgeon of the New York police department in 1861; lecturer on genito-urinary diseases at the New York College of Physicians and Surgeons 1862–71, and clinical professor there from the date last named. Among surgical instruments invented by him may be cited the urethrometer; and the dilating catheter. He published 'History of the Panama Railroad and the Pacific Mail Steamship Company' (1849); 'Urethral Strictures' (1877); 'Genito-Urinary Diseases' (1883).

Otis, Harrison Gray, American orator and statesman, nephew of James Otis (q.v.): b. Boston, Mass., 8 Oct. 1765; d. there 28 Oct. 1848. He was graduated from Harvard in 1783, studied law and was admitted to the bar in 1786. He was a member of Congress, 1797–1801, and United States Senator, 1817–22. He had previously sat in the Massachusetts Legislature; and he took an active part in the Hartford Convention of 1814; and was mayor of Boston in 1829. His published works include: 'Letters in Defense of the Hartford Convention' (1824), and 'Orations and Addresses.'

Otis, James, American Revolutionary statesman: b. West Barnstable, Mass., 5 Feb. 1725; d. Andover, Mass., 23 May 1783. He was graduated from Harvard in 1743, studied law in the office of Jeremiah Gridley at Boston, was admitted to the bar at Plymouth, but after two years of practice there settled in 1748 in Boston, where he quickly attained eminence in the courts. During his rise in the law, he found an avocation in the study of the classical and English literatures, and published 'The Rudiments of Latin Prosody' (1760), a work of careful scholarship. He was appointed attorney-general, but this post he resigned rather than support the writs of assistance, application for which had been made in the Massachusetts supreme court. These writs were warrants permitting general search for smuggled goods, and Otis was entirely convinced of their illegality. In February 1761 the matter came to debate before the court. Gridley appeared for the crown and Otis and Oxenbridge Thacher, another well-known lawyer, for the opposition. Otis' speech, occupying some four or five hours and marked by an argument of great learning and intellectual force, has been called the prologue of the Revolution. John Adams, whose notes taken in the court-room and later revised are the only authority for the content of this great effort, declares that "then and there was the first scene of the first act of opposition to the arbitrary claims of Great Britain." Decision was reserved; and though some writs were granted, none was ever enforced. In 1761 Otis was elected to the legislature, where he gained a high reputation for his eloquence and patriotic earnestness. From this time until 1769 he was the pre-eminent leader of thought in that discussion and development of opinion which preceded the war. In 1762 he published 'A Vindication of the Conduct of the House of Representatives of the Province of Massachusetts Bay,' a brochure of "exasperating candor," of which

John Adams said, "How many volumes are concentrated in this little fugitive pamphlet . . . !" This is regarded as a chief source for subsequent arguments against Parliamentary taxation and in favor of free speech. It was followed by two others, 'The Rights of the British Colonies Asserted and Proved' (1764), which maintained a conciliatory tone and was therefore displeasing to the extremists, and 'Considerations on Behalf of the Colonies' (1765), increasingly bitter, and satisfactory to his previous critics. Otis was a prominent member of the Stamp Act congress, which met at New York in October 1765; in 1766 was elected speaker of the general court, but did not assume office because of the negative of the governor. In 1768, after Townshend's bill for the taxation of the colonies had been passed by Parliament, the general court despatched to the remaining colonies a second circular-letter, urging unity in some plan toward common protection. This letter was drafted by Otis and corrected by Samuel Adams. Bernard, royal governor, demanded the recall of the letter as traitorous, and Otis made a speech, advocating non-compliance, which the royalists thought might be the "most violent, insolent, abusive, and treasonable declaration" ever uttered. But the legislature did not vote for the recall of the circular. Otis was now wholly occupied with public interests, writing for the press and addressing political gatherings. In 1769 he was accused in England of treason by the customs commissioners, and replied by a denunciation of the commissioners of the Boston 'Gazette.' He thus became involved in a quarrel with Robinson, one of the commissioners, during which he received a wound of the head which is supposed to have brought about his subsequent insanity. He was awarded £2,000 damages, but refused to claim the sum upon receipt of a written apology. During the rest of his life he was subject to fits of aberration, and though he was in the legislature in 1771 and for a brief time resumed his Boston practice, he continued in general unequal to public and professional duties. While in an unbalanced condition he took part in the battle of Bunker Hill. He was killed by a flash of lightning. More than any other American Otis gave the impetus and direction to the struggle for independence. Consult the biographies by Knapp (in 'Sketches of Eminent Lawyers, Statesmen, and Men of Letters' (1821) and Tudor (1823); also Tyler, 'Literary History of the American Revolution' (1897).

Otis, James. See KALER, JAMES OTIS.

Oti'tis Me'dia, inflammation, acute or chronic, of the middle ear or tympanum. It is accompanied by an effusion into the tympanic cavity, either of serous fluid, when the affection is catarrhal, or of purulent matter. It may arise from the causes which produce a common cold, sometimes spreading from affections of the nose and throat; and it may result from the intrusion of water or other fluid into the middle ear through the Eustachian tube, which often occurs during the act of bathing or by way of the nasal passages in connection with the use of the douche. Whether acute or chronic, the disease is of serious importance, and requires thorough medical treatment. See DEAFNESS; EAR.

Otoc'yon. See CAPE FOX.

O'tolith. See ANATOMY; EAR.

Otomi, ō-tō'mē, aboriginal Mexican people now living in the mountains of Guanajuato, Queretaro, and Hidalgo, but in early times inhabitants of the plain of Mexico. A trifle shorter and darker than the other natives they also differ from the other Mexican Indians in their unique monosyllabic language, which is, however, probably distantly related to the other native dialects. The Otomi, or, to use their own name, the Hia-hui, show a high stage of industrial development; their cults and their arts are an important source for the American ethnologist. They number possibly 200,000.

Otón, ō-tōn', Philippines, a pueblo of the province of Iloílo, Panay, situated on the southeastern coast of Iloílo Strait, six miles west of the town of Iloílo; it is connected by road with Iloílo and other towns of the province. Pop. 13,630.

Otranto, ō-trän'tō, Italy, the Latin Hydruntum, and capital of the Terra di Otranto, now the province of Lecce, in the extreme southeast of Italy, on the Gulf of Otranto, 29 miles by rail southeast of Lecce. The Strait of Otranto, 45 miles wide, separates it from Cape Linguetta on the opposite coast of Turkey. During the later period of the Roman empire and all through the Middle Ages Otranto was the chief port of Italy on the Adriatic, whence passengers took ship for Greece — having in this respect supplanted the famous Brundisium of earlier times. In 1480 it was taken by the Turks. Its castle, now a picturesque ruin, gives the title to Horace Walpole's well-known story. The town is the seat of an archbishop, and has a cathedral, restored after the siege by the Turks, with fine mosaics and an ancient crypt. Pop. (1901) 2,401.

Otsego, ŏt-sē'gō, a lake in Otsego County, N. Y., the main source of the Susquehanna River. It is a beautiful body of water; along its shores are many attractive cottages, but it is noted chiefly for its connection with James Fenimore Cooper (q.v.). Cooperstown (q.v.) is on the south shore.

Otsego Bass. See WHITEFISH.

Otsu, ō-tsoo, Japan, a town in the island of Hondo, finely situated at the southern extremity of Lake Biwa, a few miles by rail east of Kioto. It has many religious edifices and a strong fortress. Pop. (1898) 34,225.

Ot'tar of Roses. See ATTAR OF ROSES.

Ottava Rima, ōt-tä'vä rē'mä, a form of versification, favored by the early Italian poets, but long since obsolete. Boccaccio and Ariosto adopted the form for many of their longer poems.

Ottawa, ŏt'a-wa, Canada, city, capital of the Dominion of Canada and of Carleton County in the Province of Ontario; at the confluence of the Ottawa and Rideau rivers, and on the New York & O., the Canadian Pacific, the Canadian Atlantic, and the Grand Trunk R.R.'s; about 120 miles west of Montreal. The Chaudière Falls, in the Ottawa River, is 600 feet wide and 40 feet high. A railway and a road bridge spans the river near the falls. A second falls in the Rideau River east of the city, is not as large as the Chaudière but supplies extensive water-power. Four bridges cross the

PARLIAMENT BUILDINGS AT OTTAWA—FRONT.

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Rideau River. The Ottawa River, extending into a vast forest region northwest beyond Lake Nipissing, is the great route by which lumber of a large district is brought to Ottawa to be manufactured. In 1827 the Rideau Canal was opened; it passes through the city and connects the Ottawa River with the Rideau Lakes, thus opening a short water route to Kingston on Lake Ontario, and bringing Ottawa in close connection with the Great Lakes. The lumber from the forest region to the northeast is brought to the mills of Ottawa and Hull (across the river from Ottawa) over the Gatineau River; and the Du Lièvre River connects with the city the region to the east, where are large phosphate deposits. The industries connected with lumber are the most prominent. The cut of timber in the Ottawa Valley has been nearly 700,000,000 cubic feet in one year, and almost every foot was prepared for market in the Ottawa and Hull lumber mills. Other manufacturing establishments are flour-mills, tanneries, match factories, brick and tile works, foundries, machine-shops, paper mills, railroad car and repair shops, furniture factories, carriage works, and wooden-ware factories.

The Parliament and official buildings, 125 feet above the river, on Parliament Hill, covering nearly four acres, are the Italian Gothic style, and are built of Canadian sandstone quarried in the Ottawa Valley and Devonian sandstone from Potsdam, N. Y. The foundation-stone was laid by the Prince of Wales (King Edward VII.) in 1860. The buildings, including Victoria Tower, 180 feet high, and the library, cost about $8,000,000. Other prominent public buildings are Rideau Hall, the residence of the governor-general, the post-office, telegraph offices, city hall, banks, churches, and schools. There are two cathedrals, Protestant Episcopal and Roman Catholic, and hospitals, orphanages, and homes for the friendless. Under the school laws of the province separate schools are maintained for Protestants and Catholics. The chief schools are the University of Ottawa (R. C.), a provincial normal school, affiliated with the Toronto University, Ladies' College, Saint Joseph's College, and a number of special schools in charge of the Oblate Fathers, three theological schools, a number of private academies, and public schools under both the Protestant and Roman Catholic school boards. There are several large libraries, chief of which is the Parliamentary library which contains (1904) about 200,000 volumes. Other institutions which contribute to the educational advantages of the city are the geological museum, the national art gallery, music schools, and business colleges. Representatives from many foreign countries, among them a United States consul-general, are in Ottawa. There are a number of chartered and branch banks and postal savings banks. Hull (q.v.), across the river and in the Province of Quebec, is one with Ottawa in commercial and industrial matters, but entirely separate in municipal government. The government is vested in a mayor and corporation.

In the last of the 18th century a man named Wright, from Boston, Mass., settled across the river and named the place Hull. Wright claimed the land on the south bank of the river, and he offered where Ottawa now stands and more, to a man named Sparks, as payment for labor. Sparks, after much persuasion, accepted the land. The British Government sent Colonel By, in 1823, to survey the Rideau Canal. Laborers on the canal settled on the Sparks' land (1827) and the place was called Bytown. In 1854 it was incorporated as a city and the name was changed to Ottawa. In 1858 Queen Victoria selected it as the capital of Canada. The first Dominion Parliament was held here in 1865. Pop. (1891) 44,154; (1901) 59,902.

Ottawa, Ill., city, county-seat of La Salle County; at the confluence of the Fox and Illinois rivers, on the Illinois & Michigan Canal, and the Chicago, B. & Q. and the Chicago, R. I. & P. R.R.'s; about 80 miles southwest of Chicago. It was settled as farm land in the early part of the 19th century, but was not incorporated until 1837. It is in a productive agricultural region, in which are extensive deposits of fire-clay, glass-sand, and bituminous coal. It has considerable manufacturing interests, the chief establishments are glass factories, potteries, agricultural implement shops, saddleries, carriage factories, and organ and piano factories. It has a large trade in brick, tile, sewer pipe, and other manufactures, and in farm and dairy products. Some of the prominent buildings are the Illinois Appellate Court building, the city and county buildings, the Ryburn Memorial Hospital, and the church and school buildings. Its educational institutions are Pleasant View College, under the auspices of the Lutherans, Saint Francis Xavier Academy (R. C.), public and parish schools, a high school library, and Odd Fellows' and Reddick's public libraries. It has four beautiful parks. The city charter, in accordance with the State law of 1871, provides for a mayor, who holds office two years, and a council. The members of the school board are chosen by popular vote. The city owns the electric-light plant and owns and operates the waterworks. Pop. (1890) 9,985; (1900) 10,588.

Ottawa, Kan., city, county-seat of Franklin County; on Marais des Cygnes River; and on the Missouri Pacific, the Atchison, T. & S. F., and the Southern Kansas R.R.'s; about 40 miles southeast of Topeka. It is in a farming and dairy section. The place was named for the Ottawa Indians who emigrated from Canada in 1833. The town was founded by John Tecumseh Jones, a Pottawatomie missionary, who taught the Ottawas. The Santa Fé Railroad shops, employing 400 men, are located here. It has flour mills, carriage works, creameries, grain elevators, and furniture factory. There is considerable trade in live-stock, dairy products, nursery stock, grain, wool, and fruit. It is an attractive, residential city, with well-kept streets and fine parks. It is noted for its moral tone and as being an educational centre. It is the seat of Ottawa University, a Baptist institution which had, in 1903, 700 students. It has the summer educational and social gathering called the Ottawa Chautauqua Assembly, the second (in point of time) "Chautauqua" in the United States. It has also a free public library. There are 22 church edifices, and the place is often called "The City of Churches." Since the State "Prohibitory Law" went into effect, Ottawa has never tolerated the least indication of a saloon or joint, and the city has but one policeman.

At least 90 per cent of the population are native born white Americans. Pop. (1890) 6,248; (1900) 6,934; (1 Jan. 1904) 8,000.

H. J. ALLEN,
Editor 'Ottawa Herald.'

Ottawa, Ohio, village, county-seat of Putnam County; on the Blanchard River, and on the Findlay, Ft. W. & W., the Cincinnati, H. & D., and other railroads. It is about 90 miles northwest of Columbus. It is in a farming section, and has several industries connected with farm products and stock-raising. Its chief manufactures are flour, lumber and lumber products, clay products, and dairy products. Pop. (1890) 1,717; (1900) 2,322.

Ottawa Indians, or **Ottawas,** an important American tribe of the Algonquin family formerly residing in the region of the Ottawa River in Canada. They were the allies and friends of the French, and also of the Hurons, by which latter friendship they incurred the hatred of the Iroquois. During the Revolution they were under British influence. They joined in treaties made in 1785 and 1789, but took up arms with the Miamis soon after, again making peace in 1795. Numerous treaties ceding territory around Lake Michigan to the United States followed. A part went south of the Missouri in 1833, where they lost their identity. A band of Ottawas in Ohio removed to the Osage in 1836. Those remaining became scattered. The emigrants again removed to Indian Territory in 1870. In 1836 the Michigan Ottawas ceded all their lands except reservations. In Canada several thousand Ottawas still survive, scattered throughout Ontario in small tribes.

Ottawa, a river of Canada, the chief affluent of the Saint Lawrence, forming the boundary between the provinces of Quebec and Ontario. It rises in the high land which divides the basin of Hudson Bay from that of the Saint Lawrence in lat. 48° 30′ N. and for 300 miles, from its source to Lake Temiscamingue, runs from northeast to southwest. Suddenly changing its direction, it flows to the southeast for 400 miles, widening at its outlet into the expanse of water known as the Lake of Two Mountains, and finally discharges into the Saint Lawrence at the Saint Ann's Rapids, above the island of Montreal. Six miles above the city of Ottawa the rapids begin, which terminate in the Chaudière Falls, 40 feet high. The Ottawa is navigable from its junction with the Saint Lawrence to the falls, which are surmounted by the Rideau Canal, communicating by means of locks with Kingston. The river is of considerable commercial importance, from the immense quantity of fine timber cut on its banks, and on those of its tributaries, the chief of which are the Gatineau, Madawasca, Rideau, and Rivière du Lièvre.

Ottawa University, founded in 1865 at Ottawa, Kan. It was incorporated under the joint control of the Baptists and the Ottawa Indians; the legislature set apart 20,000 acres from the Indians' reservation for the University, with the provision that two of the six trustees should be Indians. This arrangement did not prove entirely satisfactory, and in 1873 an adjustment was made that placed the university entirely under the control of the Baptist denomination. There is a preparatory department, and in addition to the regular college instruction, there are courses in pedagogy and business. The college work is arranged in three courses, classical, scientific, and philosophical, leading to the three degrees of A.B., B.S., and Ph.B. All courses are open to women. The library in 1903 contained 4,000 volumes; the productive funds amounted to $85,000, and the annual income was $43,290. The students (1903) numbered 630, and the faculty 23.

Ottendorfer, ŏt'ĕn-dôr-fĕr, **Oswald,** German-American journalist: b. Zwittau, Moravia, 26 Fed. 1826; d. 16 Dec. 1900. After studying law at Prague and Vienna he came to this country after the revolutionary disturbances of 1848 and settling in New York in 1850, soon became editor of the *New-Yorker Staats-Zeitung* and later its proprietor. Under his management it became the most influential German daily in America and after 1861 was independent in politics. He built and endowed an educational institution in his native town, founded a home for aged and poor men on Long Island, and established the Ottendorfer free library in New York.

Ot'ter, a carnivorous mammal of the weasel family (*Mustelidæ*). The otters differ from the weasels chiefly in their webbed feet and aquatic life. The body is elongated and averages, exclusive of the tail, about 2½ feet in length; the tail being somewhat tapering, but flattened, and serving as an efficient rudder to guide the swimming movements of the animal. The legs are short, but muscular, and exceedingly mobile; each foot possessing five webbed toes. The lips are whiskered; the ears short, and the eyes large and prominent. The under fur is short, closely set, and woolly, and the outer coat of longer and coarser hairs, of dark-brown hue. In habits the otters are chiefly nocturnal animals, swimming about at night to prey on fishes, of which they are great destroyers, leaving many mangled after merely eating part of the flesh. They wander about a great deal in winter, going across the fields from stream to stream. The burrow is constructed near the water's edge, the nest being situated at some depth in the bank of the river and lined with grass and leaves. From four to five young are produced in June.

The American otter (*Lutra canadensis*) averages about four feet in length, inclusive of the tail. The fur is of a lustrous brown color. It inhabits America generally, but is most plentiful in Canada, being rare on the Atlantic border of the United States. The Mackenzie River, and other streams running into the Arctic Sea, form noted haunts of the Canadian otter. It is chiefly noted for its fur, which is much valued commercially. A peculiar winter habit of this otter consists in numbers of these animals selecting a sloping bank of a river or a ridge of snow, and sliding down the sloping surface upon their bellies, the fore-legs being bent backward, while by means of the hind legs a swift forward impulse is given to the body. This sport (for such it really is) may be continued for a considerable time, the whole process reminding one of schoolboys similarly amusing themselves. These animals are caught in steel traps, which are set generally near the entrance to the burrow, and they have been exterminated in almost all the easily accessible streams of the country.

The European otter (*L. vulgaris*) inhabits Europe generally, and is a well-known denizen

of Scotch rivers and streams. To the salmon it is particularly destructive, a pair of otters destroying an immense number of fish, and, as already remarked, leaving large numbers in a mangled condition after each meal. The pursuit of fishes is carried on with great dexterity by the otters, the lithe body accommodating itself quickly to all the turns and gyrations of the finny prey. This otter, although usually of an untamable and somewhat ferocious disposition, can occasionally be domesticated to a very perfect extent. A species (*L. nair*) is said to be tamed in India by fishermen, and used for hunting fish; and in Great Britain tame otters have occasionally been kept for a similar purpose. The otter is still hunted for sport by means of dogs (see OTTER-HOUND) bred and trained to their work. When brought to bay the otter will defend itself with great pertinacity, and will successfully meet any single dog of ordinary strength. When forced to the water the otter swims deftly, and remains for very long periods concealed and swimming beneath the surface. On *maigre* days the Roman Catholic Church permits the flesh of the otter to be eaten. It is said to be dark-colored, rank, and of fishy taste. The fur is used, but not to any great extent.

Consult: Coues, 'Fur-bearing Animals' (1877); Stone and Cram, 'American Animals' (1902); and works on British and East Indian mammals. Compare SEA-OTTER.

Otter, or **Ancon Sheep,** a breed of sheep, which arose in Dover, Mass., in 1791, from a long-bodied ram which was deformed in that its legs were extremely short and bent outward, or bowed, like those of an otter. The progeny of this ram when mated with an ordinary ewe, were often deformed like the sire; and for a long period the breed was easily maintained in that district, where it was esteemed because unable to jump over low walls and fences. This case is of great scientific interest as an example of prepotency (q.v.) in a sire, and also as an example of how a sudden variation or sport may be perpetuated. It is also of interest to note that when, after a time, care was no longer taken to maintain the breed, it disappeared by crossing with ordinary sheep: the last typical specimen recorded died in 1813. Consult Humphreys, 'Philosophical Transactions' (London, 1813).

Otter Creek, a stream rising on the southern boundary of Rutland County, Vt., flows north-northwest through Rutland and Addison counties and empties into Lake Champlain near Ferrisburg. It is 90 miles long and is navigable for eight miles from its mouth. It supplies excellent water-power to a number of towns, the most important of which are Vergennes, Middlebury, and Rutland.

Otter-hound, or **Otter-dog,** a large, rough-haired, powerful, hardy, and courageous breed of hounds, cultivated especially in Great Britain to assist in otter-hunting. These dogs must be able to follow the game into the water and fight it in its retreats. A fair specimen will stand two feet tall, and weighs 65 to 75 pounds. Consult Lee, 'Modern Dogs' (1897).

Otter-shrew, a very large South African aquatic shrew, which has a strange resemblance in appearance and habits to an otter. See POTAMOGALE.

Otterbein, ŏt'tĕr-bīn, **Philip William,** American United Brethren clergyman: b. Dillenburg, Germany, 4 June 1726; d. Baltimore, Md., 17 Nov. 1813. He was ordained in the Reformed (German) Church ministry at Herborn in 1749 and in 1752 was sent as a missionary to America, where he first settled at Lancaster, Pa., thereafter having charge of the congregations at Tulpehocken and York, Pa., and of Frederick, Md. At Lancaster he experienced what he termed a change of heart and as a result introduced the innovations of class-meetings, open-air meetings, and prayer-meetings, and frequently made lengthy itinerant tours, founding what later became a new sect, the United Brethren in Christ. In 1774 he assumed charge of the parish at Baltimore where he remained for nearly 40 years. He was a man of great learning and wide influence; he co-operated with the Methodist preachers who came to Pennsylvania and Maryland, and at his death the church which he had founded had in its service about 100 preachers and 20,000 members. Consult 'Life,' by Drury (1884).

Otterbein University, founded in 1847 at Westerville, Ohio, under the auspices of the United Brethren in Christ. It was chartered with full university privileges, and was the first educational institution established under the control of the United Brethren; it was named in honor of Philip William Otterbein (q.v.). Its organization includes a college department, a preparatory department, with a three-years' course, and post-graduate, normal, music, and art departments. The college work is arranged in two courses, classical and philosophical, leading to the degrees of A.B. and Ph.B. The university has been coeducational from the first; and there is a dormitory for the women students on the campus. The Christian Association building was the first of its kind in the State. In 1903 the library contained 10,000 volumes; the buildings and grounds were valued at over $95,000; the productive funds amounted to $70,000; and the annual income was $46.260. The students numbered 257, and the faculty 30.

Ottley, ŏt'lĭ, **Robert Lawrence,** English Anglican clergyman: b. Richmond, Yorkshire, 2 Sept. 1856. He was educated at Oxford, took orders in the Established Church, was principal of Pusey House, Oxford, in 1893, and has been rector of Winterbourne Basset, Wiltshire, from 1897. He has published 'Lancelot Andrewes' (1893); 'The Doctrine of the Incarnation' (1895); 'Aspects of the Old Testament' (1897); 'The Hebrew Prophets' (1898); 'Short History of the Hebrews' (1901).

Otto. See OTHO.

Otto of Rose. See ATTAR.

Ottoman (ŏt'ō-man) **Empire,** or **Empire of the Osmanlis** (*Osnali Vilayeti*), comprehends all the territories more or less under the dominion of the Turkish Sultan. It includes in Europe a considerable portion of the Balkan Peninsula (the Turkish dominions here have been greatly curtailed in modern times), part being comprised in the province of Eastern Rumelia, now united to the principality of Bulgaria; part in Bosnia, Herzegovina, etc., held by Austria; in Asia, the Anatolian Peninsula or Asia Minor, a portion of Armenia and Kurdistan, Syria,

Mesopotamia, etc.; besides Samos, Rhodes, Crete, and other islands; in Africa, Egypt, and the vilayet of Tripoli (the Sudan and Tunis being lost to Turkey). The empire extends over 1,580,000 square miles, with a population of about 40,000,000, of which about 11,000,000 belong to Europe, over 17,000,000 to Asia, and about 11,000,000 to Africa. These figures refer to the Turkish empire in the largest sense, including the nominally subject states of Egypt, Bulgaria, Bosnia, Crete, etc. For further geographical details see the different countries, EGYPT, SYRIA, TRIPOLI, TUNIS, TURKEY, etc.

Ottumwa, ŏ-tŭm'wą, Iowa, city, county-seat of Wapello County; on the Des Moines River, and on the Chicago, B. & Q., the Chicago, R. I. & P., the Iowa C., the Chicago, M. & S. P., and the Wabash R.R.'s; about 80 miles southeast of Des Moines. It was settled in 1849 and in 1851 was incorporated. It is in a productive agricultural region in which there are extensive coal-fields. It has good water-power which combined with abundance of coal tends to develop manufacturing industries. The chief industrial establishments are mining and agricultural implement works, foundries, iron works, pork-packing plant, flour mills, starch factory, coal and lumber yards, and grain elevators. It has a large trade in the manufactures, coal, farm products, live-stock, and fruit. The prominent buildings are the United States Government building, the Y. M. C. A. building, opera-house, the Union Railroad Station, court-house, churches, schools, and library. The educational institutions are Saint Joseph's Academy, a high school, public and parish schools, and a public library. The government is administered under a charter of 1892 and provides for a mayor, who holds office two years, and a council. Pop. (1890) 14,001; (1900) 18,197.

Otumba, ō-toom'bä, Mexico, town, state of Mexico, on the Mexican railroad, 30 miles northeast of the City of Mexico. It is the ancient Indian pueblo of Otompan, inhabited probably by the Otomi Indians. Here Cortes defeated the Aztecs in a desperate battle 7 July 1520, during his retreat from the City of Mexico. Pop. (estimated) 2,500.

Otway, ŏt'wā, **Thomas,** English dramatist: b. Trotton, Sussex, 3 March 1652; d. Tower Hill, London, 14 April 1685. He was educated at Winchester College, and at Christ Church, Oxford. An appearance on the stage in Mrs. Aphra Behn's company in London in 1671 was unsuccessful, and he returned to Oxford for a time, only to leave without a degree in 1674, and after a year in the army to return to London as an author. 'Alcibiades' (1675) and 'Don Carlos' (1676), especially the latter, which may be paralleled with Schiller's play, being taken from the same French original by St. Real, were unusually well received and won for Otway the favor of Betterton. Adaptations of Molière and Racine followed, and in 1678 Otway essayed the comic with the prose play 'Friendship in Fashion,' another great success in his own day, though marked by much indecency. But Otway did not profit by his success, what with drink and various amours, notably his passion for Mrs. Barry, who played in most of his plays, and was mistress of the Duke of Rochester. He left London for the army (1678–9), and upon his return wrote 'The Orphan' (1680), a comedy called 'The Soldier's Fortune' (1681), 'Venice Preserved' (1682), and another comedy 'The Atheist' (1684). The two comedies are little better than worthless; whereas the two tragedies, 'Venice Preserved,' ranking the higher, are by far the most powerful of the contemporary stage, being remarkable particularly for the simple and strong delineation of the passions, and being generally held the most pathetic and provocative of tears of the whole English drama. Otway wrote much miscellaneous verse, satires, dedications, prologues and epilogues, but all contemporary and early biographers agree that he died in want, though they differ as to details. 'Venice Preserved' enjoyed a European repute, there being versions in French, Dutch, German, Russian, and Italian; with 'The Orphan' and 'The Soldier's Fortune' it is contained in the 'Mermaid Series' (1891). A complete edition of Otway is that by Thornton (1813). Consult: De Grisy, 'Etude sur Thomas Otway' (1868); Mosen, 'Ueber Thomas Otways Leben und Werke' (1875); Löwenberg, 'Ueber Otways und Schillers Don Carlos' (1886).

Ouachita (wäsh'ī-ta) **College,** established at Arkadelphia, Ark., in 1886, under the control of the Baptist denomination. The work of the college is in two courses, classical and literary, and the degrees of bachelor of arts and bachelor of letters are conferred. There is also a preparatory department. The college is coeducational, and the number of women in attendance averages about one-half the total number of students. The income is derived from tuition fees, there being no endowment; in 1903 the income amounted to $20,000; the grounds and buildings were valued at over $80,000. The library contained 3,500 volumes; the students numbered 416, and the faculty 30.

Ouakari, wä-kä're, a South American monkey of the genus *Brachyurus,* remarkable for the extreme shortness of the tail, and for the great length of the whitish hair upon the body, while the head is almost bald and the bare skin of the face is brilliant red. These small monkeys abound in the Brazilian forests, where three species are known, and one of which (*B. uakaria*) is among those most often seen and best liked as pets.

Ouananiche, wä-nä-nēsh', a land-locked relative of the Atlantic salmon, named *Salmo ouananiche,* and often written winninish, wananiche, and in various other ways. It inhabits various lakes and ponds in eastern Quebec and Labrador, but is most familiar in and about Lake Saint John, north of Quebec. From most of its stations it can go to and return from the sea if it pleases, but never seems to do so. This salmon differs very little from a typical salmon except in its smaller size, and most ichthyologists have held it, and the similar Sebago salmon, to be only local varieties of *Salmo salar;* but Jordan now regards both as separate species. The largeness of the eye and of the black spots are conspicuous distinguishing characteristics among others. "As a game fish," says Jordan, "those who have had experience with the ouananiche think it has no equal. They may be taken at any time between the going out of the ice and the middle of September, though the best fishing is said to be late in May. During the early part of the season it may be taken with bait of

worms, pork, pieces of chub or even ouananiche itself along the shore of Lake Saint John. It is occasionally taken then with the artificial fly, but fly-fishing for the ouananiche is usually not a successful method of capturing it.» The literature of American angling abounds with descriptions of this fish and its sport, and special treatises upon it have been written by McCarthy, Chambers, Van Dyke and others.

Oubliette, oo-blĭ-ĕt', a secret dungeon or pit constructed in old castles, forts and other buildings, in which were confined persons condemned to perpetual imprisonment or to secret death. It was usually entered by a staircase or steps reaching to the top of a chamber, in the floor of which was an opening into the dungeon. This opening served also for the admission of light and air.

Oudh, owd, or **Oude,** British India; (1) a town, the former capital of the province of Oudh, on both banks of the Gogra, 77 miles east of Lucknow. It is greatly venerated by Hindus; but its ancient temples are in ruins, and its only structures deserving notice are a mosque built by Aurungzebe, some Mohammedan tombs, and an iron bridge across the river. Pop. 12,000. (2) a semi-independent province politically attached to and forming with Agra, the United Provinces of Agra, and Oudh (q.v.) prior to 1901 known as the Northwest Provinces. Oudh is bounded on the north by Nepal and on the other sides by Agra, the lieutenant-governor of which administers Oudh as chief-commissioner since 1877. Oudh is distinguished by an independent judicial system. The area is 23,066 square miles; the surface mostly level, very fertile, and watered by the Gogra, Gunti, and other tributaries of the Ganges. The Ganges itself forms nearly all its southern boundary. Among the inhabitants are numerous Rajputs; many of the population are Mussulmans. Oudh was formerly a Mogul province, and became subordinate to the British after the battle of Kalpi in 1765. In 1801 Gorakhpur and some other eastern districts were annexed from this territory to the British dominions. In 1819 the vizier threw off his nominal dependence on the Mogul sovereign, and assumed the title of king.

A disputed succession, and partial revolt in 1837, were the chief subsequent events until 1856, when complaints of misgovernment led to the annexation of the country to the British dominions, an annual pension of £120,000 being settled on the king. This measure, however, produced much dissatisfaction, and when, in 1857, the Mutiny broke out, most of the Oudh sepoys joined it, and the siege of Lucknow resulted. (See INDIAN MUTINY.) Agriculture has made great advances, the area under crop having largely increased. Wheat, barley, rice, sugar, indigo, and other products are raised in large quantities; in some districts a vast amount of nitre effloresces on the soil. Numerous schools have been established. Oudh includes the two divisions of Lucknow and Faizabad. Lucknow is the capital; other towns are Faizabad, Shahabad, and Bharaich. Pop. (1901) 12,884,150.

Oudinot, oo'dē-nō, **Charles Nicolas,** DUKE OF REGGIO, French marshal: b. Bar-le-Duc, France, 26 April 1767; d. Paris, France, 13 Sept. 1847. Entering the army he had attained the rank of captain at the outbreak of the Revolution. He joined forces with the populace but crushed an uprising in his native district in 1790 and in 1794 was given command of a brigade. In the war with Prussia and Austria he won distinction, in 1799 became general of division, and was thereafter much trusted by Napoleon, receiving the command of 10 battalions in 1805. He was at Austerlitz and Jena, and at Ostrolenka, Russia, in 1807 he routed the Russians; at Friedland in 1807 and at Wagram in 1809 his bravery was so marked that after the latter battle he was made marshal of France and Duke of Reggio. In 1810 he occupied Holland and in the unfortunate campaign against the Russians in 1812 he earned high praise for his skilful generalship. In the battles between the French and the Allies he played a prominent part and was loyal to Napoleon to the last, but after the restoration of the Bourbons took office under them. In 1823 he led the invading army into Spain, acted as governor of Madrid for a time, and became governor of the Invalides in 1842.

Oudinot, Charles Nicolas-Victor, DUKE OF REGGIO, French general, son of the preceding: b. Bar-le-Duc, France, 3 Nov. 1791; d. Paris, France, 7 July 1863. He was a prominent figure in the war in Algeria, was later appointed commander-in-chief, and in 1848 led the attack upon Rome. For his protests against the *coup d'état* in 1851 he was arrested, but his release followed shortly whereupon he retired from public life.

Ouida, oo-ē'da, pen name of LOUISE DE LA RAMÉE, English novelist: b. Bury St. Edmunds 1840. She had a French mother and her father was an Englishman of some culture. She began to write for periodicals in the early 60's, using as a pseudonym her Christian name as pronounced by a baby sister. About 1868 she left London for Italy, and has since resided there, mainly in Florence. Her novels, which have been very popular though abounding in over-wrought sentiment are exceedingly dramatic and are not without literary merit. A few of the many titles are: 'Held in Bondage' (1863), 'Strathmore' (1865), 'Under Two Flags' (1867), 'Trecotrin' (1869), 'A Dog of Flanders' (1872), 'Two Little Wooden Shoes' (1874), 'In Maremma' (1882), 'Ruffino' (1890), 'The New Priesthood' (1893), 'The Mascarenes' (1897), 'The Waters of Edera' (1900), and 'Street Dust' (1901).

Ouistite, wĭs'tī-tī. See MARMOSET.

Ouless, oo-lĕs', **Walter William,** English painter: b. St. Heliers, Jersey, 21 Sept. 1848. He was educated at Victoria College in his native town, and at 16 became a student at the Royal Academy where he has been a constant exhibitor since 1869. He was elected an associate in 1877, and a full member in 1881. About 1872 he applied himself to portrait-painting, in which he has attained a high rank. Among his sitters have been Darwin, Bright, Cardinals Newman and Manning, Lord Roberts, Frederic Harrison, and the Duke of Cambridge. He was awarded a gold medal at the Paris International Exhibition of 1878, and also at the Berlin Exhibition of 1886.

Ounce, (1) the snow-leopard (q.v.); (2) in South America the jaguar (q.v.).

Ounce, a twelfth part of any magnitude, whether of length, surface, or capacity. In

Troy weight the ounce is the 12th part of the pound; in avoirdupois the ounce is the 16th part of a pound. See WEIGHTS AND MEASURES.

Our American Cousin, an English comedy by Tom Taylor, produced in 1858. There is a Yankee character in the play, originally created by Joseph Jefferson (q.v.). Lincoln was in attendance at a performance of this comedy at Ford's Theatre, Washington, when he was assassinated.

Our Lady of Good Counsel, Sisters of. See ORDERS, RELIGIOUS.

Our Lady of the Holy Rosary, Congregation of. See ORDERS, RELIGIOUS.

Our Lady of Lourdes. See ORDERS, RELIGIOUS.

Our Lady of Lourdes, Brothers of. See ORDERS, RELIGIOUS.

Our Lady of Mercy, Military Order of. See ORDERS, RELIGIOUS.

Our Lady of Perpetual Help, Sisters of. See ORDERS, RELIGIOUS.

Our Lady of Sion. See ORDERS, RELIGIOUS.

Our Mutual Friend, a novel by Charles Dickens, published in England in 1864–5. The scene is laid in London and its immediate neighborhood. Among the characters which this story has made famous are Miss Jenny Wren, the doll's dressmaker; Bella Wilfer, "the boofer lady"; the Golden Dustman, Mr. Boffin; and Silas Wegg, employed by Mr. Boffin, who is, at first, delighted with the services of "a literary man with a wooden leg."

Ouray, oo-rā', Indian chief: b. Colorado 1820; d. Los Pinos Indian agency (Colo.) 27 Aug. 1880. He was the leader of the Uncompahgre Utes, and while protecting the interests of his tribe was friendly to the whites. He spoke and wrote the Spanish language. Several times he visited Washington to appeal on behalf of his people.

Ouray, Colo., town, county-seat of Ouray County; on the Uncompahgre River and on the Denver & R. G. railroad; 160 miles west-southwest of Colorado Springs. It is at an elevation of over 7,000 feet, at the base of Mount Hayden, and in a region of grand mountain scenery. Its hot springs make it a favorite health resort. It is also the local trade centre and shipping point of the surrounding mining region, which is rich in gold and silver. It contains a miners' hospital. Pop. (1890) 2,534; (1900) 2,196.

Ouro-Preto, ō'roo prā'too, Brazil, city, state of Minas Geraes; 175 miles north of Rio de Janeiro. Rich gold deposits were found in the vicinity and the chief industry was formerly mining, but the mines have mostly been abandoned and the prosperity of the city has in consequence declined. It was originally the capital of Minas Geraes, but the state government was moved to Minas in 1894. It is built on several hills and surrounded by mountains; the streets are narrow and irregular, but some of the modern houses are well built. It is connected with Rio Janeiro by rail, and with the towns to the north and east by highway, and carries on an active trade. Pop. (1903) 16,000.

Ouse, ooz, England, (1) a river of Yorkshire also called the NORTHERN or YORKSHIRE Ouse, formed by the junction of the Swale and Ure, and after a southeast course of 60 miles, uniting with the Trent to form the estuary of the Humber. It is navigable for large vessels 45 miles to York. Its principal affluents are the Wharfe and the Aire from the west, the Don from the south, and the Derwent from the north. (2) The GREAT OUSE rises near Brackley in the county of Northampton, flows in a general northeasterly direction, traverses the counties of Buckingham, Bedford, Huntingdon, Cambridge, and Norfolk, and falls into the Wash at King's Lynn, after a course of about 160 miles, for the latter two thirds of which it is navigable. Among its affluents is (3) the LITTLE OUSE or BRANDON RIVER which joins it at the confluence of the river Stoke, and the New Bedford and Wisbech canal.

Ouseley, ooz'lĭ, SIR **Frederick Arthur Gore,** English composer and musician: b. London 12 Aug. 1825; d. Hereford 6 April 1889. He was a son of Sir Gore Ouseley (q.v.). He was graduated B.A. in 1846 from Christ Church, Oxford; succeeded to the baronetcy by his father's death in 1844, took orders, and held several metropolitan curacies in 1849–51. Having graduated as Doctor of Music at Oxford in 1854, he was appointed precentor of Hereford Cathedral in the following year, and also became professor of music in the University. In 1866 he was made a canon residentiary of Hereford Cathedral. From earliest childhood Ouseley showed remarkable musical ability and extraordinary accuracy of ear. He composed an opera of great promise when only eight. His published compositions include two oratorios, 'The Martyrdom of St. Polycarp' (1855), and 'Hagar' (1873); a large number of anthems, of which several are very well known; many full church services; numerous chants, hymn-tunes, and carols; a sacred cantata; besides overtures, glees, solos, and quartettes. He wrote three valuable works on musical theory: 'A Treatise on Harmony' (1868); 'A Treatise on Counterpoint, Canon and Fugue' (1869); and 'A Treatise on Musical Form and General Composition' (1875). He was the founder of the church and college of St. Michael, Tenbury (1856) and to it bequeathed his splendid musical library.

Ouseley, Gideon, Irish Methodist clergyman: b. Dunmore, Galway, Ireland, 24 Feb. 1762; d. Dublin, Ireland, 13 May 1839. Educated in the Roman Catholic faith he became a member of the Wesleyan Church and as a local preacher attained considerable influence over Protestants and Catholics alike although not infrequently assaulted while engaged in street preaching. As an Irish missionary he was held in high regard by the Wesleyans, his preaching being of a most successful character and his zeal unflagging. He wrote: 'A Short Defence of the Old Religion' (1812); 'Rare Discoveries' (1829); etc.

Ouseley, SIR **Gore,** English diplomat and Orientalist: b. Limerick, Ireland, 24 June 1770; d. Beaconsfield, Buckinghamshire, England, 18 Nov. 1844. In 1787 he went to India, where he engaged in business, and also gave considerable attention to the study of Oriental languages and customs, particularly the Persian, Bengalese and Hindu. On his return to England he was made a baronet (1808), and in 1810 was appointed English ambassador extraordinary to

Persia, and through his intimate knowledge of the Persian language and his skilful diplomacy was successful in obtaining a definitive treaty between England and Persia, which was finally ratified in 1814. He was also instructed in 1813 to mediate between Russia and Persia, and through his efforts a treaty was signed, suspending war between the two nations. In 1815 he returned to England, and in 1820 was admitted to the privy council. He was an able Oriental scholar, was one of the founders of the Royal Asiatic Society of London, and in 1842 became president of the Society for the Publication of Oriental Texts. 'The Gulistan of Musle-Huddeen Shaik Sâdy of Sheerez' was printed under his direction (1809); his own work, 'Biographical and Explanatory Notes on the Persian Poets' was published after his death (1846).

Ouseley, Sir **William,** English Orientalist: b. Monmouthshire, England, 1767; d. Boulogne, France, September 1842. He was educated privately and later in Paris, but in 1788 he entered the army. Tiring of military life and desirous of continuing his study of oriental languages he left the army in 1794 and entered the University of Leyden. Thereafter he devoted himself to further study and to literature, but in 1810 accompanied his brother, Sir Gore Ousely, ambassador to Persia, as his private secretary. He published: 'Oriental Collection' (1797–9); 'Travels in Various Countries of the East' (1819–23); 'Anecdotes from Oriental Bibliography' (1827); etc.

Ouseley, Sir **William Gore,** English diplomat: b. London 26 July 1797; d. there 6 March 1866. He was the son of Sir William Ouseley (q.v.). He was early engaged in the diplomatic service; and in 1825 was connected with the British legation at Washington, and at that time married a daughter of the governor of Vermont. He later was appointed to several responsible diplomatic positions in South America; and was sent on special missions to the United States and to Central America. He published: 'Remarks on the Statistics and Political Institutions of the United States' (1832); 'Notes on the Slave Trade' (1850); and 'Views in South America, from Original Drawings' (1852).

Outalibi, wä-tē-lē'bē, a fish. See Guativere.

Out'landers. See Uitlanders.

Out'lawry, an ancient custom in Great Britain of putting a person out of the protection of the law; thus an outlaw could be killed at sight like a wild beast. Outlawry in civil proceedings was formally abolished in 1879. In an act passed in 1870, however, abolishing forfeitures for treason and felony, it was expressly stated that nothing in the act was to affect the law of forfeiture consequent upon outlawry. But there is little need now for outlawing absconders from justice, since in most cases they can be laid hold of under treaties of extradition with foreign countries. The effect of outlawry is the forfeiture of the goods of the outlaw to the crown, and he cannot receive and hold property given or devised to him. In the United States, outlawry was recognized in the Colonial days, but since the War, of the Revolution the practice has been obsolete.

Outram, oo'tram, Sir **James,** English soldier: b. Butterly Hall, Derbyshire, 29 Jan. 1803; d. Pau, France, 11 March 1863. He was educated at Marischal College, Aberdeen, and in 1819 went to India, where after commanding for some time a body of irregular troops he was appointed adjutant to the 23d Bombay Native Infantry. From 1835 to 1838 he was employed in subduing the rebel chiefs of the Mahhi-Kanta. In the last-mentioned year, as adjutant to Lord Keane, he took part in the Afghan war, and distinguished himself at the capture of Khelat, and by his dangerous ride disguised through the enemy's country (1839). In various other capacities he displayed military talents of a high order, as well as admirable administrative qualities. In 1842 he was appointed commissioner to negotiate with the Ameer of Sindh, in which position he adopted views at variance with the aggressive policy of General Sir Charles James Napier, and the consequence was an acrimonious correspondence between the two soldiers, carried on, however, by both in a spirit of good faith. Sir James had the satisfaction in the end of knowing that his views were confirmed by the directors. His opponent gracefully styled him publicly the Bayard of India. In 1854 he was appointed to the residency of Oudh. He successfully conducted the war against Persia. He landed at Bushehr 27 Jan. 1857, and by a series of brilliant victories brought the war to a satisfactory conclusion in three months. At the beginning of the Mutiny he had command of two Bengal divisions, and was chief commissioner of Oudh. During the first relief of Lucknow, however, he waived his rank and served as a volunteer under Havelock. He commanded at Lucknow until the second relief (by Sir Colin Campbell), directed the evacuation, and held the place until the third relief. He was made lieutenant-general and received various and suitable recognition of his important services. A bronze statue of Outram by Noble was erected in the gardens of the Thames embankment.

Out'works, in warfare. See Fortification.

Ouzel, oo'z'l, an old name, derived from the German, for several thrush-like birds of Great Britain and the United States. The name is most often applied in England to the blackbird (q.v.), and to the larger thrush (*Turdus torquatus*), distinguished by the broad lunate stripe of white across the breast and sides of the neck, which is provincially known as ring, rock, mountain or tor ouzel. The name is also given, in the form "water-ouzel," to a small closely related bird (*Cinclus aquaticus*), other species of which occur in various mountainous parts of the world, all very similar in appearance and habits. One species (*C. mexicanus*), is numerous in the Rocky Mountain region — a small, robust, short-tailed short-winged, dark-colored bird which haunts the mountain-streams, and is commonly known as "dipper," on account of its remarkable facility in diving. Its food consists almost exclusively of snails, young insects, and other organisms which live in and about the streams; and it has the power of seeking these under water, not only by diving, but by partly swimming and partly walking with fluttering wings along the bottom in search of its prey, remaining there "two or three minutes" if it

pleases. It is a common bird in both the Rocky Mountains and in the Coast Ranges; and makes a large globular nest of mossy materials which it lodges in some crevice near a stream, often beneath the veil of a cataract. Consult: Muir, in 'Scribner's Monthly' (1878); Keyser, 'Birds of the Rockies' (1902); Coues, 'Birds of the Northwest' (1874); and British ornithologies.

Ovampo, ō-väm'pō, a people of the Bantu race residing in German southwest Africa. They are divided into separate tribes, and are said to number about 120,000. They are of very dark complexion, tall and robust, and remarkably ugly. The hair is short, crisp, and woolly. The men often shave it off, leaving the crown untouched; but the women stiffen it with a kind of red paste, in the manner practised in many other parts of Africa. The principal ornaments are heavy iron anklets, a profusion of cowries and other shells, and beads of every size and color, so arranged as to hide a considerable part of the person. Their staple food is grain. The houses are of a circular form, with a circuit of 16 feet and a height not much exceeding 4 feet. These huts, arranged in groups are enclosed by strong palisades. The domestic animals are oxen, sheep, goats, pigs, dogs, and poultry. The arms consist of bows and arrows, a dagger, asegais, and knob-kerries. Though thus provided with weapons the Ovampo are peacefully disposed and industrious.

Ovando, ō-vän'dō, **Nicolás de,** Spanish soldier and administrator: b. Valladolid, Spain, about 1460; d. Madrid, Spain, about 1518. In 1501 he was appointed successor to Boabdilla as governor of Hispaniola; in February 1502 he sailed from Spain with a fleet of 30 ships and 2,500 persons in his company and landed at San Domingo. Almost his first act as governor was to refuse aid to Columbus whom he would not allow to land at San Domingo and he permitted months to pass without sending aid when he knew Columbus was in sore straits at Jamaica. His treatment of the Indians was cruel in the extreme and one of the blackest deeds in his career was his treacherous massacre of the 84 caciques of Queen Anacaona at Xaragua, and her subsequent execution. In the course of his despotic rule the number of Indians in his province was reduced to 60,000 in 1507 against 500,000 at the arrival of the Spaniards. Aside from his treatment of the Indians Ovando was an able governor and the colony flourished. He was recalled in 1509.

Ovariot'omy. See OVARY.

O'vary, one of the paired glands which form the essential part of the organs of generation in the female, and produce the eggs or ova; it is homologous to the testis of the male, where spermatozoa originate. The ovaries are two elongated oval bodies, flattened from above downward, one on each side of the uterus, attached to the broad ligament. Each ovary is about 1½ inches in length, and ⅓ inch thick. It consists of many ovisacs, or Graafian follicles or vesicles (in which the ova are developed), imbedded in a stroma or framework, and also of blood-vessels, nerves, and lymphatics, and is invested with a serous covering or membrane derived from the peritoneum. In females who have never menstruated, the surface of the ovary is smooth; after menstruation has been established it is rough and marked with scars, due to the rupture and closure of the Graafian vesicles. At undetermined periods, from puberty on, probably at or near the time of menstruation, the fluid (liquor folliculi) within certain ovisacs increases, distention of the sacs occurs, and a rupture at the weakest point, with discharge of the ovum. This is ovulation, the function of the ovary. Most physiologists believe that ovulation is associated with menstruation, but some writers contend that menstruation may occur without accompanying ovulation, and *vice versa.* Usually the ova, when discharged, are conveyed through the Fallopian tubes (q.v.) to the uterus. If the ovum unites with the spermatozoa of the male it becomes impregnated or fertilized. After the discharge of the ovum, the Graafian vesicle usually fills with blood, which coagulates. The coagulum, squeezing out the serum, becomes decolorized, its periphery assumes a yellowish color and the resultant spot is the corpus luteum. The corpus luteum of pregnancy is larger and remains for a longer time than that formed when pregnancy does not occur.

Diseases of the Ovaries.— The affections of the ovaries may be classified as malformations, displacements, functional disorders, inflammations, and tumors. One or both ovaries may be congenitally absent. This condition is rare, and when it does occur it generally coexists with a want of development of the vulva, vagina, and uterus. Sometimes the ovaries are undeveloped. In both these conditions the women lack constitutional vigor and development. Displacement of the ovary into the inguinal canal, or labia majora (hernia), is generally congenital, but may be caused by a strain or fall. Prolapse or dislocation of the ovary, causing it to sink downward toward the pelvic floor, results from a disturbance of the delicate adjustment of the organ, by an abnormal increase in its weight, a weakening of its supports, or an unusual traction upon it. The functional affections are neuralgic in character. Ovarian neuralgia (ovarialgia or oöphoralgia), of which the principal symptom is sharp local pain, is frequently associated with hysteria or other neuroses, headache, intercostal neuralgia, etc., and it may be caused by a local engorgement or induration pressing on sensitive nerves. Inflammation of the ovary (ovaritis or oöphoritis) may be acute or chronic. The acute form is often preceded by hyperæmia, or an excess of blood-supply at the time of the monthly period, from some obstruction of the venous circulation. Pain in the ovarian region, especially during menstruation, inability to walk, and painful defecation are the principal symptoms of acute ovaritis. The inflammation is frequently associated with pelvic cellulitis and peritonitis and may be caused by injuries, gonorrhœal infection, puerperal sepsis, and the acute exanthemata. Sometimes abscesses form, or sterility results. Chronic ovaritis is usually the result of an inflammation, acute or subacute, but may be caused by self-abuse, sexual excitement, etc. The connective tissue of the ovary thickens, decreasing the size of the organ (cirrhosis) and tends to the formation of cysts, that is to say, cystic degeneration. A sickening pain, tenderness, and reflex neuralgias are symptoms. The tumors of the ovary are carcinoma, fibroma, and cystic tumors.

Ovariotomy.— This is the operation of modern surgery for removal of ovarian tumors

or of ovaries themselves. It was first performed in 1809, and long considered exceedingly dangerous, but has been performed with great and increasing success, especially since the adoption of antiseptic treatment. See ANATOMY, COMPARATIVE.

Oven, a closed, box-like chamber of any description in which a considerable degree of heat may be generated, used for baking, heating, or drying any substance. The term is usually restricted to a close chamber for baking bread and other food substances; but ovens are also used for coking coal, in the art of metallurgy, in glass-making, pottery, etc. There is now a great diversity in the shape and materials of construction, and modes of heating ovens. The old type of baker's oven, still very largely used, is a low arched chamber either of brick with a tile or stone sole, or built entirely of stone. The door is in front, and the pans of dough are put in with a long wooden spade. In one class of these ovens the fireplace or furnace is placed in the front corner, with an opening admitting the products of combustion directly into the oven, while there is an exit flue on the other side. A remarkable apparatus for the economic preparation of food both as regards the expenditure of fuel and the saving of waste is the Aladdin Oven, invented by Edward Atkinson, of Boston. This apparatus has been developed from a study of the Scandinavian Cooking Box, much used in Norway and Sweden. This box consists of an outer case of wood or other non-heat-conducting material, lined with hair felt. Into this cavity a metallic box, containing food with sufficient liquid heated to the boiling point, is placed and tightly closed in. The heat is thus retained for a long period, completing the process of cooking. On this basis was devised an outer oven of non-heat-conducting material in which, separated by a sufficient space for the circulation of heat, is placed a metallic oven or cooking chamber. Heat is passed from the top of a round-wicked kerosene lamp through a hole in the bottom of the outer oven. This heat passes around the entire inner oven, the products of combustion passing out at the same orifice at which the heat entered. There is no direct communication between the lamp or source of heat and the cooking chamber. By this apparatus a normal temperature can be maintained for a definite number of hours, either at the temperature of simmering or stewing at about 160° F., or at the temperature for baking and roasting not exceeding 300° to 320° F. By suitable arrangements thereto very little difference in temperature is found between the top and the bottom of the oven. The heat can be regulated by the size of the lamp and height of the flame. Meats, fish, vegetables, and puddings can be cooked in the same chamber without the flavor of one being imparted to the other, the heat being kept below the distilling point of the animal fats or of the fruit and vegetable juices. In this apparatus two pounds of kerosene oil are computed to do the work of 120 pounds of anthracite coal burned in the ordinary stove or range and to do it in a more wholesome and appetizing manner. The patents on this apparatus have been dedicated to public use.

Oven Birds, birds belonging to the subfamily *Furnarinæ,* in the family *Dendrocolaptidæ* (tree-creepers). The oven-birds are found in tropical America, and Argentina, and are all of small size, and feed upon seeds, fruits, and insects. They walk on the ground with great ease. Some of these forms appear to frequent the shore, where they feed upon small mollusks and crabs. They are said to be exceedingly tame: the best-known species—(*Furnarius fuliginosus*) haunting village gardens and seeming to court the company of man. Their popular name is derived from the form of the nest which they construct. It is built of straws and dried leaves mixed with clay, and resembles an oven in its conical shape, being about eight inches in diameter. The walls are about an inch thick. The aperture exists at the side, and the interior is divided by a partition-wall into two rooms, in the inner of which the eggs are deposited. The nest is placed on a high and generally exposed site. Other species make strange nests of various kinds, one being a massive cylinder of mud.

In the United States the name oven-bird is commonly given to the golden-crowned water-thrush, a small terrestrial warbler, which builds a covered nest on the ground in the woods. See WATER-THRUSH.

Ov'enshine, Samuel, American military officer: b. Pennsylvania 2 April 1843. He entered the Union army at the outbreak of the Civil War in 1861 and was commissioned 2d lieutenant, rising to the rank of captain in 1864. He continued in the army after the close of the War and in 1898 was appointed brigadier-general of volunteers, and in 1899 was made brigadier-general of regulars and placed in command of a brigade in the Philippine Islands. In the year last named he was retired from active service.

Overbeck, ō'vĕr-bĕk, **Johann Friedrich,** German painter: b. Lübeck 4 July 1789; d. Rome 12 Nov. 1869. He became very early imbued with the spirit of romanticism (q.v.) and on commencing his art studies at Vienna 1806, found at the Academy congenial friends in Pforr, Vogel, and others of the same school. Their devotion to the old Flemish and Italian masters met with much criticism and opposition in the academy and in 1810 Overbeck left for Rome where he associated himself with Schadow in the development of their common ideals. In the following year Cornelius joined their company and a little later Philip Veit and J. Schorr united with them in the formation of an artistic brotherhood. Their headquarters was the studio in the monastery of Saint Isidore, and they professed their object to be the religious and moral in art. Their aim was the revival of German art on the lines quatrocentists (q.v.) of Italy. They were first known as the Monastic Brotherhood of Saint Isidore and later as Nazarenes (q.v.), of whom Overbeck was the acknowledged leader. The first important work which they executed was the history of Joseph in the 'Casa Zuccara' near the Trinità de' Monti, then occupied by Consul-General Bartholdy. Overbeck painted there the 'Selling of Joseph' (1816) the cartoon for which is now in the city museum at Frankfort. He also contributed 'The Seven Lean Years' (1851). Five of the frescoes illustrating Tasso's 'Jerusalem Delivered' in the villa of the Marchioness Massimi, are also his work. He decorated with

frescoes the church of Santa Maria at Assisi, and among his numerous oil paintings examples are to be found in Saint Martin's Church, Lübeck, the New Picture Gallery at Munich, and the Berlin National Gallery. The last remarkable pictures which he executed were the 'Coronation of the Virgin,' now in the City of Mexico; and 'Jesus Descending from the Hill of Nazareth,' in the museum of Antwerp. All his work is distinguished by refined drawing, noble composition, and a profound spirit of devotion, and these characterize the 40 well-known designs illustrating New Testament history, all of which have been engraved, and some of them printed in colors. Among the founders of the German Romantic School of painting Overbeck is the only one who kept unfalteringly to the original programme of the Nazarenes. His productions are of rare excellence in the perfection of the grouping, in directness and simplicity of expression, and a purity of outline which recalls Perugino and the earlier style of Raphael. A sincere religious spirit pervades every conception, and the corporeal is dominated by the spiritual in all his refined ascetic forms and faces. It would seem that his love of the ecclesiastical and monastic type of character, and his enthusiasm for mediævalism, had much influence in his conversion to the Roman Catholic Church (1813). He exercised great influence as professor in the Academy of San Luca at Rome, and his most noted pupils were S. Steinle and Führich. Consult: Atkinson, 'Life of J. F. Overbeck'; Dohmes, 'Kunst und Künstler des 19. Jahrhunderts' (1883–95).

Overbury, ō'vėr-bĕr-ĭ, Sir **Thomas,** English author: b. Ilmington parish, Warwickshire, 1581; d. London 15 Sept. 1613. He was educated at Queen's College, Oxford. He became adviser to the Earl of Rochester, then Robert Carr, at the court of James I., and provoked the anger of the Countess of Essex by endeavoring to dissuade his friend from marrying her. Rochester had the address to procure the imprisonment of Overbury in the Tower of London, where he was slowly poisoned by secret agents. Carr (then Earl of Somerset) and Lady Essex were convicted but pardoned. Overbury was highly cultured and was credited by Jonson with the introduction into court circles of intelligent appreciation of literature and art. His best remembered work is his 'Characters,' published as an appendix to his poem 'A Wife' (1614). Selections from 'Characters' were issued in 'The Cornhill Booklet' for August 1901.

Overcomers, a name commonly applied to a religious society originated in Chicago, but now dwelling at Jerusalem, where they style themselves the "American Colony in Jerusalem." They have all property in common and have abolished among themselves the institution of marriage. They profess to have discovered the true interpretation of the Bible, by which all nations are to be brought into liberty, righteousness and love.

O'verland Route, a popular term applied to the route to California as distinguished from the route via the Isthmus of Panama. Also a term first used for the route from Europe to India via Egypt, the desert, and Suez. It was in contradistinction to the Cape route which was by water only. It became more applicable in 1837, when the route was across the European continent by Marseilles; in 1845, when that by Trieste followed; and in 1872, when that via the Mount Cenis tunnel and Brindisi came into use. It also came into use in 1899 for the land route from Victoria, B. C., to the Alaskan gold fields.

Overseers of the Poor, in the United States, are county officers whose duty is to make provision for the maintenance of the poor of the county. In New York and a few other States this duty devolves upon the county supervisors. In Great Britain overseers are public officers appointed annually in every urban district for the purpose of raising by rate on the inhabitants the sums necessary for the relief of the poor, and applying such sums to their relief. They have been appointed since the time of Queen Elizabeth by the important poor law act then passed. Their appointment must take place on the 25th of March or within a fortnight thereafter. Peers, members of Parliament, clergymen of any denomination, barristers, attorneys, doctors, military and naval officers, and others whose avocations require continual personal attendance are exempt from serving the office. All who are not exempted by some statute, and even women, are liable to be appointed, and it is an indictable misdemeanor to refuse without good cause to serve when duly appointed. The office is gratuitous, and no person is to be appointed overseer who is directly or indirectly concerned in any contract for the supply of any goods, materials, or provisions for the workhouse or for the relief of the poor of the district. In granting relief to the poor, overseers have no discretionary power except in extreme emergencies, and in no case is the relief to be in money.

O'verstone, Samuel Jones Loyd, Baron, English financier: b. London, England, 25 Sept. 1796; d. there 17 Nov. 1883. He was graduated from Cambridge in 1818, entered his father's banking-house and became its head before its consolidation with the London and Westminster Bank. He was member of Parliament for Hythe in 1819–26 and became a recognized authority on questions of finance. He strenuously opposed the introduction of limited liability and of the decimal system, but did not engage in politics after 1833, when he was defeated as candidate to Parliament for Manchester. He was the author of many valuable tracts on questions of finance, and the Bank Act of 1844 was directly due to the influence of his writings. In 1850 he was created Baron Overstone and Fotheringhay.

O'vert, in law, evident, undisguised; an overt act signifies an act which may be clearly proved, and was manifestly intended.

O'verton, Gwendolen, American novelist: b. Fort Hays, Kan., 19 Feb. 1876. She was educated in Paris and Switzerland and has published 'The Heritage of Unrest' (1901).

Overton, John Henry, English Anglican clergyman: b. Louth, Lincolnshire, 4 Jan. 1835. He was educated at Oxford, took orders in the English Church, and was curate of Quedgely 1858–60; vicar of Legbourne 1860–83; rector of Epworth 1883–99; and rector of Gumley from 1898. He has been canon of Lincoln Cathedral since 1879 and was Birbeck lecturer on ecclesias-

tical history at Trinity College, Cambridge, 1902–3. He has published 'The English Church in the 18th Century' with C. J. Abbey; 'William Law: Non-juror and Mystic'; 'Life in the English Church 1660–1714'; 'Life of Christopher Wordsworth: Bishop of Lincoln'; 'Evangelical Revival in the 18th Century'; 'John Wesley'; 'The English Church in the 19th Century 1880–1833'; 'The Anglican Revival'; etc.

O'verture, in music, an introductory symphony, chiefly used to precede great musical compositions, as oratorios and operas. The Germans have composed overtures for poetical works, as Beethoven's overture to Goethe's Egmont. Overtures are often played independently of the work for which they were written, as at the beginning of concerts; but their highest office is to convey to the intelligent lover of music the whole character of the following piece or to concentrate its chief musical ideas so as to give a sort of outline of it in instrumental music. The latter mode of composing overtures was first conceived by the French, and such is the character of the overtures of their great composers, among whom may be classed Cherubini. Carl Maria von Weber, in the overtures to the 'Freischütz' and 'Oberon,' in which the general character of the following piece is given, has observed this rule, which did not exist when Mozart composed his admirable overtures to 'Figaro' and 'Don Juan.' In the oldest overtures the fugue was the chief part, preceded by a *grave* and closing in the dominant. Another form came into vogue at a later period — three musical parts, in different movements — an *allegro,* an *andante,* and again an *allegro* or *presto,* were united. At present the most usual form is a brilliant and passionate *allegro,* preceded by a short, solemn passage. See also PRELUDE.

Overyssel, ō'vĕr-ĭs-sĕl, Netherlands, an eastern province separated by the Yssel River, whence its name, from the province of Gelderland. Area, 1,283 square miles. Capital, Zwolle. Pop. of province (1900) 338,408. See NETHERLANDS.

Ov'id (PUBLIUS OVIDIUS NASO), Roman poet: b. Sulmo, among the Peligni, 20 March 43 B.C.; d. Tomi, on the Euxine, 17 A.D. He and his elder brother, Lucius, enjoyed a careful education with a view of becoming lawyers. Ovid attained considerable skill in declamation. But in spite of his father's opposition he devoted much of his time to poetry. On the death of his brother, at 20, this opposition seems to have diminished,— the property that would have been but scanty for two might amply suffice for one. He went to Athens where he gained a thorough knowledge of Greek. He afterward traveled in Asia and Sicily in company with the poet Macer, one of his relations. After his return to Rome he never prosecuted the legal profession with energy, if indeed at all. He never entered the senate, although by birth entitled to that dignity. He became, however, successively one of the Triumviri capitales, of the Centumviri, and of the Decemviri, but neglected the duties of these offices, being devoted to licentious pleasures. He married twice in early life, but speedily divorced each of his wives. In his 30th year he married his third wife whom he sincerely loved, and by whom he had a daughter, Perilla. Till his 50th year Ovid continued to reside at Rome, when by an edict of Augustus, 8 A.D., he was commanded to leave Rome for Tomi, a town on the shores of the Black Sea, near the mouths of the Danube, the habitation of the rude Getæ, and the extreme limit of the empire. According to some the cause of this sentence was his intrigue with Julia, but she was exiled seven years before; her daughter, the younger Julia, was exiled at the same time as the poet, and perhaps his fate had some connection with hers. Some critics have supposed that he was acquainted with the licentiousness of the emperor and his family, and had therefore become obnoxious. The change from the luxurious life of a Roman courtier and man about town to that of an exile among barbarians must have been far from agreeable; the climate and the danger arising from incursions of plundering hordes increased his misery. His humble entreaties to the imperial court to shorten the term or change the place of banishment were of no avail. He sought relief in the exercise of his poetical talents, until worn out by grief and disappointment he died of a broken heart. The following is a list of his works: (1) 'Amorum Libri III'; (2) 'Epistolæ Heroïdum,' 21 in number; (3) 'Ars Amatoria' or 'De Arte Amandi' (The Art of Love), written about 2 B.C., and ejected from the public libraries by command of Augustus at the time of the author's banishment; (4) 'Remedia Amoris'; (5) 'Nux'; (6) 'Metamorphoseon Libri XV.,' the most popular of the poet's works written between the age of 40 and 50. It consists of narratives of all the transformations recorded in legend up to the death of Julius Cæsar, whose change into a star ends the series. (7) 'Fastorum Libri XII,' of which only the first six are extant; (8) 'Tristia' (5 books); (9) 'Epistolarum ex-Ponto Libri IV,' both consisting of elegiac poems, in which the exile mourns his unhappy lot and supplicates for his recall; (10) 'Ibis.' As a poet Ovid is distinguished for his masterly versification, his felicity and clearness of expression, his power of highly colored and picturesque description, and his tasteful imagery. His facility however sometimes degenerates into empty trifling, and he often beats out a fancy with tedious prolixity. His elegies often glitter with a sort of cold-blooded eroticism which comes rather from the brain than the heart, and he is much more a rhetorician than a poet, although the marvelous ingenuity of his technique has inspired the versifiers of all modern languages from the Renaissance to the present day. His metamorphoses are filled with clever passages, but marred by palpable artificiality; the episode of Myrrha is indeed tinged with a certain tragic intensity which recalls the Hippolytus of Euripides, but the only trace of deep and exalted feeling in the whole range of his works appears in the 'Tristia,' where he details the circumstances of his setting out from his home for a banishment which was to be perpetual. The best edition of Ovid's complete works is Ehwald's (Leipsic 1889–94). There are several good editions of single poems, and an English translation of the whole of them is in the Bohn Library.

Oviedo, ō-vē-ā'thō, Spain; (1) a town in the Asturias, capital of a province of the same name, 230 miles northwest of Madrid. It is walled, and has clean but irregular streets. The

Gothic cathedral, university, and other educational establishments, court-house and hospital are the chief buildings. The manufactures are hats, arms, linen, etc. In 1809 Oviedo was given up to pillage for three days by Ney. Pop. (1900) 48,374. (2) The province, area 4,091 square miles, is situated on the Bay of Biscay, and bounded by the provinces of Santander, Leon, and Lugo. It has a wild and stormy coast, and a mountainous interior better adapted for pasture than agriculture. Great numbers of cattle, goats, and swine are raised; linens, woolens, leather, etc., are manufactured, and coal is exported. Pop. (1897) 612,663.

Oviedo y Valdez, ē väl-dāth', **Gonzalo Fernandez de,** Spanish historian: b. Madrid 1478; d. Valadolid 1557. In 1513 he received a government appointment in the newly discovered Island of Hispaniola, and with few intervals spent the rest of his life there. As governor of the mines in the island his conduct was cruel to the Indians, and many perished under his barbarous treatment. Named by Charles V. historiographer of the Indies, he wrote his 'Sumario de la Historia General y Natural de las Indias Occidentales' (1535 et seq.). He wrote also 'Quinquagenas,' so entitled from its consisting of 50 dialogues, in which the author is the chief interlocutor.

Ovipos'itor, an organ developed in relation to the orifice of the genital ducts of female insects, whose normal function is to place the fertilized egg in a position most suitable to its proper development. When typically developed the ovipositor consists of three pairs of stiff or membranous unjointed styles or gonopophyses, of which the anterior or lowermost closely ensheathes the other two. The three pairs together form a tube into the base of which the oviduct opens and along which the eggs are conducted to the situation selected for their deposition. The homology of these styles is not fully settled, but the generally accepted and best supported view is that they represent the embryonic appendages of the seventh, eighth and ninth abdominal segments, from which they are directly developed in at least some cases. In the entire orders of *Lepidoptera, Coleoptera* and *Diptera,* as well as in many representatives of other orders, no true ovipositor is developed. In such cases the terminal segments of the abdomen may form a retractile and protractile tube serving as an egg-conductor. The *Orthoptera, Odonata, Hymenoptera* and *Hemiptera* exhibit the organ in its highest state of development, and variously modified to meet various conditions. In the locusts it has the form of a stout sickle-blade, permanently exserted, and efficient in splitting plant tissues for the reception of the eggs. The sawflies have the margin of the outer sheath serrated for cutting slits into leaves, etc., while the cicadas completely shatter twigs by the power of their ovipositors. Some of the ichneumon flies (q.v.) have ovipositors remarkably adapted to their parasitic habits; in the long-tailed ichneumon-fly, for example, the organ is filamentous and so long and powerful that it is capable of penetrating the solid wood of tree trunks to a depth of several inches, reaching and depositing eggs within the burrows of woodborers on which the ichneumon-fly larvæ subsist.

The most remarkable of all modifications of the ovipositor, however, is found among the ants, bees, and wasps, in most of which it becomes a most efficient and beautifully constructed poisoning apparatus or sting, which consequently is possessed by the females alone. The sting, like other ovipositors, consists of three pairs of styles, but the middle pair are united into a single barbed piece grooved on the ventral side, and partly ensheathing the inner pair of very acute piercing darts. The outer pair form a protecting sheath to the sting proper. Within the abdomen is a tubular venom gland, with a reservoir and duct opening into the base of the grooved piece. When in operation the latter and the two darts work alternately in and out, penetrating deeper and deeper into the wound into which they conduct the venom. The male genital armature of insects is derived from essentially the same embryonic parts as the ovipositor and sting of the female, but never reaches the same structural complexity and serves solely as a clasping organ during copulation. Consult Packard, 'Text-book of Entomology' (1898).

O'vis, a genus of the family *Bovidæ* and subfamily *Ovinæ,* including the sheep (q.v.).

O'vule, an outgrowth of the carpel of a plant where, by fertilization with pollen, a seed is formed. The ovules are always enclosed in the cavity of the ovary, or seed-producing organ. They are developed as a rule from the margin of the carpels, but several exceptional modes of development exist. See SEED.

O'vum, an egg. See EMBRYOLOGY; EGG.

Owatonna, ō-wạ-tŏn'nạ, Minn., city, county-seat of Steel County; on the Straight River, and on the Chicago & N., the Burlington, C. R. & N., and the Chicago, M. & St. P. R.R.'s; about 65 miles south of Saint Paul. It was settled in 1855 and incorporated in 1865. It is in an agricultural region in which corn, wheat, and nursery stock are important products. The chief manufactures are dairy products, flour, foundry and machine-shop products, soap, butter tubs, churns, automobiles, carriages, seeders, engines, and fanning mills. The prominent buildings are the court-house, opera-house, city hospital, the church and school buildings. There are three parks, four steel bridges, and a large number of fine residences. The educational institutions are the State School for Dependent and Neglected Children, the Pillsbury Academy, Sacred Heart Academy, public and parish schools, and a public library which contains about 7,000 volumes. The government is vested in a mayor who holds office one year and a council. The city owns the waterworks. Pop. (1890) 3,849; (1900) 5,561.

Owego, ō-wē'gō, N. Y., village, county-seat of Tioga County; on the Susquehanna River at the mouth of the Owego Creek, and on the Delaware, L. & W., the Lehigh Valley, and the Erie R.R.'s; about 30 miles east of Elmira and 20 miles west of Binghamton. It was settled in 1785 by James and Robert McMasters and others. It was chartered as a village in 1827. An Indian village, on the site of the present Owego, was destroyed in 1779. It is in

a farming section, but has considerable manufacturing interests. The steel bridge works have about 150 employees; the mica works, 75; the leather glove factory, 35; the wagon works, 150; cigar factory, 40; saddlery, 50; silk glove factory, 150; piano factory, 15; and other manufacturing industries employ about 100 more persons. Owego has considerable trade in lumber, farm products, and its own manufactures. The educational institutions are the Owego Free Academy, union and graded schools, one parish school, and the Coburn Free Library. There are seven churches. The three banks have a capital of $200,000; the annual business amounts to $800,000. The government is vested in a president and six trustees; three of the trustees are chosen each year by popular vote. There is a colored population of about 10 per cent of the whole. Pop. (1900) 5,039.

L. W. KINGMAN,
Editor 'Owego Gazette.'

Owen, ō'ĕn, **David Dale,** American geologist: b. New Lanark, Scotland, 24 June 1807; d. New Harmony, Ind., 13 Nov. 1860. He was educated at Hofwyl, Switzerland, and in 1823 accompanied his father to the United States and assisted him in his socialistic undertaking at New Harmony. He made a special study of geology and natural science and his investigations took him over a large portion of Indiana and Iowa. He made a government geological survey of Iowa, Wisconsin, and Minnesota, beginning in 1848 and in 1852–7 was engaged in a geological survey of Kentucky. He was appointed State geologist of Kansas in 1857. Among his publications are reports of his surveys of Indiana and Arkansas (1858–60).

Owen, John, English non-conformist clergyman: b. Stadham, Oxfordshire, England, 1616; d. Ealing, Middlesex, England, 24 Aug. 1683. He was educated at Oxford and early espoused the parliamentary cause in the civil war. In 1642–6 he was pastor at Fordham, Essex, and in the latter year took charge of a Presbyterian congregation at Coggeswall, Essex, and there introduced independent church government. He was appointed private chaplain to Cromwell in 1649 and in 1651 was dean of Christ Church, Oxford, where he was vice-chancellor of the university in 1652–7. Losing favor with Cromwell, he was removed from his office as dean in 1660 and though offered a parish in Boston, Mass., in 1663 and the presidency of Harvard College in 1670 declined both and lived in retirement, devoting much time to literary work. His most notable work was an 'Exposition of the Epistle to the Hebrews' (1668–84). His collected works were published in Edinburgh in 1850–5 and in Philadelphia in 1865–9. Consult 'Life' by W. Orme (1820).

Owen, Mary Alicia, American author: b. Saint Joseph, Mo., 29 Jan. 1858. She was educated at Vassar College and turned her attention to the study of Indian lore; her discoveries in Voodoo magic are important and she has been admitted to tribal membership with the Indians and to their secret societies. She has also made a study of the gypsies, and has published: 'Voodoo Tales'; 'Oracles and Witches'; etc.

Owen, SIR Richard, English naturalist: b. Lancaster 20 July 1804; d. Richmond Park 18 Dec. 1892. He studied at the University of Edinburgh, began practice in London as a surgeon in 1826, became lecturer in comparative anatomy at St. Bartholomew's hospital in 1829, later was conservator of the Hunterian Museum of the Royal College of Surgeons until 1856, and in 1836–56 was first Hunterian professor of comparative anatomy and physiology. In 1838 he received the Wollaston gold medal of the Geological Society, and in 1840 became the first president of the Microscopical Society. From 1856 to 1883 he was superintendent of the natural history collections of the British Museum. In 1887 he obtained the removal of these collections from the Museum and their establishment at South Kensington as a museum of natural history. He was the first Rede lecturer at Cambridge in 1859, and received numerous foreign distinctions including the decorations of many orders and the Cuvier prize (1857). In 1857 he assisted David Livingstone (q.v.) in the preparation of the latter's 'Missionary Travels and Researches in South Africa,' and in 1861 published an edition of the posthumous papers of John Hunter. Among the more important of his own works were 'Odontography' (1840–5); 'Lectures on the Comparative Anatomy and Physiology of Invertebrates' (1843); 'History of British Fossil Mammals and Birds' (1846); 'On the Anatomy of Invertebrates' (1866–8); 'Researches on Fossil Remains of Extinct Mammals of Australia' (1877–8), and 'Memoirs on Extinct Wingless Birds of New Zealand' (1879). By 1856 he had won recognition as the leading anatomist of his time. His scientific labors were extensive and continuous, and he was an active and often bitter controversialist. He was with Cuvier a pioneer in vertebrate palæontology, and made to the study many important contributions, including prominently a paper on 'Archæopteryx' (1863). His discoveries also were numerous, and he was among the first to work toward a concise nomenclature in anatomy. Consult 'Life' by his grandson (1894).

Owen, Robert, English social theorist: b. Newtown, Montgomeryshire, North Wales, 14 May 1771; d. there 17 Nov. 1858. He established a small cotton-spinning works at Manchester, and later became known as a successful manager of large mills. In 1794–5 he organized the Chorlton Twist company, which operated the new Lanark mills, and in 1814 a new company was established. This included the names of William Allen, Joseph Fox, Jeremy Bentham, and other noted philanthropists and reformers, and was organized on the principle "that all profits beyond 5 per cent per annum on the capital invested shall be laid aside for the religious, educational and moral improvement of the workers and of the community at large." The employment of children was stopped, a new system of education established, the houses improved and insurance funds established; and the community of New Lanark became noted for the prosperity of its people. In 1813 Owen published 'New Views of Society, or Essays upon the Formation of Human Character,' and in

1826–44 a 'Book of the New Moral World,' in which he advanced and developed his socialistic views, insisting upon an absolute equality among men. In 1817, he presented a report to a Parliamentary committee on the causes of poverty and means of avoiding it, in which he outlined a plan for the establishment of a co-operative village, federations of such villages to form a world republic. In 1829 he gave up the management of the Lanark Mills, and devoted his time and entire fortune to the propagation of his socialist doctrines. He visited the principal towns of Great Britain and the United States, where he was received with favor. He set up two social communities on his own plan, one at Orbiston in Lanarkshire, another at New Harmony, Ind. They proved signal failures, their originator attributing their non-success to their not being sufficiently carried out on his principles. In his later years he became a believer in Spiritualism. He was a man thoroughly sincere and respected for his integrity; he is regarded as one of the founders of English socialism; many of his followers were active in the Chartist movement (q.v.). See Jones, 'Life, Times, and Labors of Robert Owen' (1890); Holyoke, 'Life and Last Days of Robert Owen' (1871); and Owen's incomplete autobiography (1857–8).

Owen, Robert Dale, American social reformer: b. Glasgow, Scotland, 9 Nov. 1800; d. Lake George 17 June 1877. He was educated in Switzerland and England, and came to the United States for the first time in 1825 in connection with the ill-starred communistic experiment of the elder Owen (q.v.) at New Harmony, Posey County, Ind. In 1826 he received from Fanny Wright 860 acres of unimproved land at Nashoba, near Memphis, Tenn., for the purpose of establishing under white direction a settlement of liberated negroes. This scheme was as impossible as the other. In 1827 he established at New York with Fanny Wright a journal called 'The Free Inquirer,' a socialistic and agnostic publication. In 1832 he returned to Indiana, where in 1835 he was elected to the legislature as a Democrat. He was also chosen to Congress in 1843 and 1845. A measure concerning the Oregon boundary, introduced by him in 1844, became the basis of the settlement of 1846. He was prominent in the founding of the Smithsonian Institution (1845) and in the remodeling of the Indiana constitution (1850). In 1853 he was made *chargé d'affaires* at Naples, in 1855 minister. After his return (1850) he was active as an abolitionist. He was, at least in later days, a firm believer in Spiritualism, and in this connection were written some of his most interesting works, such as, 'Footprints on the Boundary of Another World' (1859), and 'Debatable Land between this World and the Next' (1872). Others of his writings are: 'The Personality of God and the Authority of the Bible' (1832), and 'Pocahontas: A Drama' (1837); 'Threading My Way' (1874), an autobiography covering the first 27 years of his career.

Owen Meredith. See LYTTON, EDWARD ROBERT.

Owen Sound, Canada, the county-seat of Grey County, Ontario, a town and port of entry at the mouth of Sydenham River, and at the head of its estuary called Owen Sound, an outlet on Georgian Bay, Lake Huron. It is a terminal of branches of the Grand Trunk and Canadian Pacific R.R.'s; 100 miles northwest of Toronto, has one of the best harbors on the lake, and steamships communicating with the principal lake ports. It has manufactures of agricultural and mill machinery and implements, sewing machines and furniture, and lumber-mills, flour mills, and grain elevators. A U. S. consular agent is resident at Owen Sound. Pop. (1901) 8,777.

Owens, ō'ĕnz, **John Edward,** American actor: b. Liverpool, England, 4 May 1824; d. near Towson, Md., 6 Dec. 1886. He came with his parents to the United States when three years old, was educated in Philadelphia and made his first appearance as an actor there in 1841. In 1849 he was manager of the Baltimore Museum and in 1852 opened Brougham's Lyceum in New York and was well received; after a tour of Europe he was manager of the Charles Street Theatre in Baltimore and afterward starred successfully for several seasons. In 1864–5 he made a brilliant nine months' run at Wallack's Theatre, New York, in 'Solon Shingle,' afterward playing the same part in London. Upon his return he starred in various stock companies and in 1882–3 made his last engagement in New York at Madison Square Theatre in 'Esmeralda.'

Owens College, Manchester, England, was established under the will of John Owens, a Manchester merchant, who died July 1846, and left about $500,000 for the purpose of founding an institution for providing or aiding the means of instructing youths over 14 years of age, in such branches of learning and science as are now or may be hereafter taught in the English universities, subject to the immutable condition that no student, professor, etc., shall be required to make any declaration or submit to any test of their religious opinions, and that theological and religious subjects shall form no part of the teaching of the college. From 1851 to 1873 the college occupied a private house, when it removed to a handsome Gothic building erected by public subscription. The success of the college led to a proposition, which received considerable ecclesiastical opposition, to incorporate a university, with several affiliated colleges located in different towns, but having its seat in Manchester. In 1880 Victoria University was instituted by royal charter, with power to grant degrees in arts, sciences, and law, a supplemental charter, granted May 1883, giving power to grant degrees in medicine. Owens College is thus the central college of the University. University College, Liverpool, was incorporated with Victoria University in 1884, and the Yorkshire College, Leeds, in 1888. A women's college, under the direction of the professors of Owens College, is also affiliated, and Victoria University grants degrees or certificates to women.

Owens Lake, a lake in Inyo County, southeastern California, east of Mount Whitney of the Sierra Nevadas, 18 miles long and 10 miles wide. It receives the waters of the Owens River (q.v.), but has no visible outlet, and its waters are very salt.

Owens River, a river of southeastern California, rises in the southern part of Mono County, flows southeast and then south, and empties into Owens Lake (q.v.); length 175 miles. Its course is through a desert valley with the Sierra Nevadas on the west and the Inyo Mountains on the east; its volume of water is considerably diminished during the summer season, some of its branches drying up entirely. A branch of the Southern Pacific Railroad parallels it for the greater part of its course.

Owensboro, ō'ĕnz-bŭr-ō, Ky., city, county-seat of Daviess County; on the Ohio River, and on the Illinois Central, the Louisville & N., and the Louisville, H. & S. L. R.R.'s; about 41 miles southeast of Evansville, Ind. It has steamer connections with all the principal river ports. It is in a farming and stock raising region, and near are forests, coal and oil fields. In the vicinity are deposits of iron, lead, zinc, and fire clay, and stone quarries are nearby. The chief manufactures are tobacco products, cellulose, wagons, carriages, whiskey, brandy, brick and tile, and iron products. It has an extensive trade in tobacco products, coal, farm products, live-stock, and manufactures. The prominent public buildings are a government building, county court-house, jail, and the high school. Its educational institutions are the Owensboro Female College (1890), Saint Francis Academy, public and parish schools. The mayor holds office four years. The waterworks and electric-light plant are owned and operated by the city. Pop. (1890) 9,837; (1900) 13,189.

Owl Parrot. See KAKAPO.

Ow'let Moths, a section of the family *Noctuidæ,* containing small species. The *Noctuidæ* is an immense assemblage of night-flying moths made up of hundreds of genera and thousands of species, and represented in all parts of the world. They are as a rule of less than medium size and of dusky tints, and are closely allied to the tiger-moths (*Arctiidæ*), from which they may be distinguished by the subcostal nervure of the hind wing anastomosing with the radial only near the base of the cell. In the fore wing the fourth and fifth radial nervures fork from the third which is connected by a cross-nervule with the second. The frenulum is present and the first maxillæ are well developed. The caterpillars are not hairy as a rule, and ten prolegs are usually present. The pupa is sometimes naked and subterranean, lying within a rude cell of clay; sometimes enclosed in a cocoon made partly of leaves, etc., on the surface of the ground.

Owls, nocturnal birds of prey of the group *Striges.* The owls form a compact clearly circumscribed group solidified by many common characters, but the question of their relationship to other birds is one which ornithologists have found most puzzling. Formerly they were united without question with the other birds-of-prey, but the raptorial bill and claws, in which the resemblance to the hawks is most striking, may well be only adaptations to similar predaceous habits. On the other hand it is equally probable that the soft plumage, highly developed sense-organs, etc., are adaptations to nocturnal activity; certainly they are least developed in the more diurnal species. As a result of more fundamental anatomical studies a strong tide of opinion has set in toward a belief in a relationship of the owls to the night-jars (*Caprimulgidæ*) and the peculiar oil-bird (*Steatornis*), with which they are often united, but as a distinct suborder (*Striges*), in the order *Coraciiformes,* but many ornithologists refuse to follow this current. The very characteristic physiognomy of the owls results chiefly from the development about the eyes of areas of radiating feathers, or facial disks, supported by a ruff of peculiar stiff recurved feathers. Frequently the head is ornamented by paired tufts of longer, erectile feathers called horns or ears, though they have nothing whatever to do with the sense of hearing, but are comparable to the crests found on the heads of many birds. The general plumage is very soft and fluffy, making noiseless flight possible and giving an exaggerated idea of bulk. The feathers have no aftershaft; and some species, like the snowy owl, have the feet and toes thickly feathered to the claws, giving them a peculiar booted appearance. The head is always remarkably large, and the bill strongly hooked and cered. A peculiarity of the large, strongly clawed feet is the versatility of the outer toe, which may be directed forward, outward or completely backward and paired with the hallux at will. In correlation with their keen senses the sense-organs are greatly developed. The great staring eyes look directly forward, and, owing to their form, can rotate but slightly in their sockets, a peculiarity which explains the owl's habit of following with the head any object at which its gaze is directed. The somewhat cylindrical or truncated conical form of the eye results from the great development of the bony sclerotic or focusing ring. Unlike most birds the upper, and not the lower, lid is chiefly employed in closing the eye, which is further protected by a conspicuous nictitating membrane. Although many differences in the degree of its development are presented, owls are almost the only birds which may be said to have an external ear approaching that of mammals. It is of course concealed beneath the feathers, but, when best developed as in the short-eared owl, covers the entire side of the head, and is provided with a prominent marginal fold of skin or "operculum." In this case the openings are asymmetrical, one being directed upward, the other downward, and in the great gray owl and its immediate allies even the skull bones are asymmetrical. By common consent the barn owls are separated from all of the others as a family (*Strigidæ*) or subfamily. They have the furculum complete and ankylosed with the sternum, and the latter with an entire posterior margin. The remaining owls (*Bubonidæ*) have the furculum free from the sternum and either very thin or incomplete in the middle, and the posterior border of the sternum notched. Not less than 50 genera and 250 species of owls, varying in size from a sparrow nearly to a small eagle, have been described, and many exhibit several color-phases. The group is absolutely cosmopolitan.

Owing to their nocturnal habits, their ways are less well known than those of most birds, but in general are much the same. With the notable exception of such species as the snowy owl and hawk-owl, they seek concealment during the day in dark retreats, but become active after nightfall. Their prey consists of snails, insects, mice, birds, rabbits or even larger animals, according to the size of the species, which they

approach on noiseless wing and usually grasp with one foot, after which it is borne away to a perch and torn to pieces. A few species feed on fishes, and one even on crabs, but never on vegetable matter. Undigested portions, as bones, hair and hard parts of insects are ejected in pellets from the mouth. Their voices present some variety; some hoot, some whistle, but the cry of many resembles a shrill laugh. Owls breed very early, many of them in late winter, and deposit their nearly spherical, white or whitish, eggs in holes in trees or rocks, in nests deserted by other birds or rudely constructed by themselves on the ground or in trees. One species, the American burrowing owl, nests in communities in or among the burrows of prairie dogs, but the association does not partake of the happy relation sometimes described. The young are interesting objects, thickly covered with down, usually white.

The mystery surrounding their nocturnal habits and their often lugubrious cries have made owls suitable objects of superstition among all peoples and in all ages. Among the ancients the owl was regarded on the one hand as a portent of dire calamity and its appearance near a sick chamber an omen of death; on the other, it was the bird of wisdom, the symbol of the goddess Athene. Both attributes naturally arose from a knowledge of the owl's keen senses, which, exaggerated in the popular imagination, enabled it to perceive knowledge beyond the common reach, and even to scent the putrescent effluvia of approaching death in the beginning of an illness. How deeply fixed and widely spread is the belief in the owl as an evil omen is shown by the frequency of its occurrence in all literatures and folk-lores. The Hindus have an interesting myth of the crow (night) and the owl (moon) contending for supremacy. Among the American Indians the owl figures in many legends. One told in the Kootenay tribe is to the effect that the wicked owl was in the habit of carrying off crying children. Through trickery it was finally killed and its body burned by the coyote, but its spirit rose from the ashes as a swarm of blood-sucking mosquitoes.

For an account of the numerous species of owls of the United States consult Baird, Brewer and Ridgway, 'North American Land Birds' (1874); Barrows, 'Standard Natural History' (1885); Sharpe, 'Catalogue of Striges of the British Museum' (1875); and for ancient and mediæval superstitions to Gubernatis, 'Zoological Mythology' (1872).

See the names of various species as BARN OWL, HAWK-OWL, etc.

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Ownership is the dominion of a thing real or personal, which one has the right to enjoy and to do with as he pleases, even to spoil or destroy it as far as law permits, except that he is prevented by some agreement or covenant restraining such right. An owner continues to have the same right although performing no acts of ownership, and although another may perform such acts without his knowledge or against his will; but an owner may lose his right in a thing if he permit it to remain in the possession of a third person for sufficient time to enable the latter to acquire a title thereto. Any thing or property may be the subject of a joint ownership by two or more persons having an equal right to it. Ownership as applied to one's title to property is the right by which a thing belongs to a particular person to the exclusion of all others. The foundation of ownership is possession, but it is not sufficient as against one who can show a better right.

Owosso, ō-wŏs'ō, Mich., city in Shiawassee County; on the Shiawassee River, and on the Grand Trunk, Michigan C., and Ann Arbor R.R's; about 80 miles west by north of Detroit and 30 miles north by east of Lansing. It was settled in 1836 by A. L. and B. O. Williams and Elia Comstock, and chartered as a city in 1859. It is in a farming region and has considerable manufacturing interest. The chief industrial establishments are furniture factories, which have about 650 employees; casket factory, 150 employees; screen door and window factory, 200; car shops, 150; sugar works, 75; miscellaneous, about 55. The prominent public buildings are the churches and schools. It has Oakside school, a business college, and a ladies' library. There are eight churches. The three banks have a combined capital of $300,000. The charter of 1895 provides for a mayor, who holds office one year, and a council of 10 members. The waterworks are owned and operated by the municipality. Pop. (1890) 6,564; (1900) 8,696.

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Ox, a bovine animal; that is, a ruminant of the sub-family *Bovinæ,* which includes the typical species of the large family *Bovidæ* (q.v.); more specifically, a male of some domesticated breed of Europe or America, or their dependencies, the female of which is called a "cow," the young a "calf" (or when one to two years old, a "heifer"), and a herd collectively "cattle." Hence, by extension, all the *Bovinæ* are spoken of as cattle, wild or tame, a list of which follows. The group is characterized by its large size and bulky form, and by various minor characteristics, of which the foremost is the roundness, smoothness, horizontal up-curving growth and comparative shortness of the horns. Like the other sections of the family, antelopes, sheep, goats, etc., oxen are easily recognized but rather difficult to define technically. The history of the group begins, so far as known, in the Lower Pliocene (Siwalik) formations of India. The oxen apparently originated in that part of the world and reached Europe and North America in the time represented by the Upper Pliocene rocks. In some of the earlier species the females seem to have been hornless; but the type quickly assumed its proper form, and some of those fossil in the Siwalik beds are closely related to our modern domesticated cattle. Europe possessed in the Pleistocene, or period just preceding the Glacial Period, a widespread, gigantic long-horned species named *Bos primigenius,* and another species (*B. brachycerus*) with much shorter horns. Both seem to have survived the Glacial Period in sufficient strength to reoccupy the continent after the recession of the ice; and

they constituted the great forest oxen, which Cæsar found in his campaigns in Gaul and Germany, and to which, not distinguishing them, he gave the general name *urus*. Some survived as late, at least, as the reign of Charlemagne, and from them were derived, no doubt, the modern domesticated races of the Western World, possibly with some small and later admixture of native Eastern species. These cattle were tall, strong, and seem to have differed mainly in the comparative length and shape of the horns; and there seems no doubt that a remnant of *Bos primigenius*, nearly, or, as some believe, quite pure, exists in the white cattle preserved in the Chillingham estates in the north of England (see CHILLINGHAM WHITE CATTLE); it is also regarded as certain that the Holstein breed is a direct descendant of this species. The other (short-horned) species has long been extinct, but was apparently the progenitor of the great body of European domestic cattle, whence have been derived the herds of America, South Africa, Australia, and, in fact, all the world except the Orient.

The domestication of cattle began in prehistoric times; and some Asiatic species now extinct may have supplied the stock represented as in the service of the civilized nations of ancient Persia, Asia Minor, Syria, and Egypt by the early carvings and paintings which have come down to us, but they may have been derived from one or both of the species above mentioned. They were carried to Carthage and westward and to southern Europe when the civilizations of Greece and the Italian peninsula arose, and some were no doubt gradually taken by Roman settlers into western Europe as fast as it was subjugated, where they would be crossed with the larger, hardier short-horned local races of Gaul. Apparently the native cattle of the British Isles were of the long-horned (*B. primigenius*) stock only; but when what now is England was conquered and colonized by the Romans and later by the Saxons, Normans, etc., the better short-horned cattle which they brought with them were substituted first in the south of England and gradually elsewhere, replacing the British long-horns everywhere except in the extreme north, where the red Highland cattle perhaps represent them to this day. The Friesian and Holstein breeds of the Netherlands, and the semi-wild Spanish cattle are regarded also as nearly direct descendants of these aboriginal long-horned oxen, and from the Spanish stock, transported to South and Central America in the 16th century, came the vast plains-ranging herds of the Argentine pampas, Mexico, Texas and neighboring States. It was not until comparatively recent times that care and improved methods of breeding began to develop in England, northern France and the Netherlands the improved breeds now so distinct and valuable for beef or for milking. Most of the early cattle brought to eastern North America seem to have been of the short-horned English variety; and these, keeping pace with European development by intelligent selection, and the frequent importation of foreign sires of high quality, and mingled with the western "scrub" cattle, have produced the excellent varieties now to be seen in the United States and Canada.

Nearest to our domestic cattle are two East Indian species, the gaur and the gayal (qq.v.), which are domesticated to some extent by the people west of the Bay of Bengal. Closely related is the banting (q.v.) of Sumatra. The common humped or Brahman cattle (see ZEBU) of India and eastward represent a distinct species, of which no wild herds remain, and which has been bred into many distinct varieties, of which one of the most aberrant is the Abyssinian sanga. The yak (q.v.) of Tibet, and the diminutive forest-ox (see ANOA) of Celebes, bring the list of oxen down to the buffalos. Of these (see BUFFALO) the East Indian species still exists in wild bands in the jungles of India and the Malayan Peninsula, but has been domesticated for a very long period, and is used as a beast of draft and of burden throughout southeastern Asia, and in many parts of tropical Africa. Africa has two native species, neither in domestication. A fourth species inhabits Mindanao, one of the Philippine Islands. The bisons (q.v.), composed of the American bison and the aurochs, neither of which have been domesticated to any practical extent, although both are extinct except in small protected herds, complete the list of the bovine animals of the world.

Consult standard zoologies, especially the writings of Blanford upon the mammals of India, Persia and Abyssinia; Lydekker, 'Oxen, Sheep and Goats of the World' (1898); and the authors cited under BISON, BUFFALO, etc.

ERNEST INGERSOLL.

Ox-bird, or **Ox-eye.** See DUNLIN.

Ox-bot, a bot-fly attacking meat cattle; a warble-fly. The well-known ox-bot or breeze-fly of Europe is *Hypoderma bovis*, and until about 1890 it was believed by naturalists that the very similar flies prevalent in North America were the same, but it is now known that they belong to a second species (*H. lineata*) locally known in the southwestern United States as heel-fly. The larvæ or warbles are called "grubs" by American stock-raisers, and affected cattle are said to be "grubby." These and various allied species parasitic upon domestic and wild animals, and even upon humanity in certain tropical regions, constitute the family *Œstridæ*. In the case of the American ox-bot (*H. lineata*) the flies appear early in spring and haunt feeding cattle, hovering especially about their legs, where they deposit their eggs mainly upon the hairs overhanging the hoofs. The egg is barely visible to the unaided eye, is cigar-shaped, and has one end formed into a clasping appendage by which it is attached to the hair. Five or six are placed in a close row on each hair. The cattle lick themselves and gather these eggs upon the tongue, where they hatch, and the maggots make their way into the gullet, where they catch on the walls, force their way through by means of the sharp spines about the head, and nest in the wall-tissues of the throat until they have undergone a molt. They remain here many weeks, then make their way to the skin of the neck and work along beneath it to the back, where during winter the presence is shown by the swelling of the hide over them. These grubs are nourished by the pus and serum produced about them by their movements. Some weeks later, or toward spring, the maggots reach maturity, molt again, become nearly an inch long, and at last force their way out through the skin; they then drop

to the ground, the larval skin dries and stiffens, and the maggot within separates itself from this old integument and turns into a pupa stage, which is speedily completed, allowing the fly to emerge in time to produce a brood before the end of the summer. The knowledge of this life-history was gained only as recently as 1890, mainly through the investigations of Dr. Cooper Curtice; and it is not yet known whether the eggs and young of *H. bovis* pass through a similar series of events.

The damage done by ox-bots is very great, and is due to the perforation of hides by the escape of the maggots; loss of milk and beef due to the fretting and often stampeding of the cattle when the flies are laying their eggs; and general depreciation of the stock. The insect is so uncommon that it may be disregarded east of the Alleghanies; but it is exceedingly numerous and troublesome in the Mississippi Valley and Southwestern States, and the cattle there, especially in Texas, betray the greatest terror in the fly season, rushing headlong when a fly appears, and if possible dashing into the water and staying there. In addition to the harm to beef and milk caused by the nervousness, exhaustion and interference thus produced, one half of the hides that reach market from the infested regions show perforation by warbles, and suffer a discount in price which on the average will amount to a third of the value of perfect hides.

Consult: Howard, 'The Insect Book' (1901); Osborn, 'Insects Affecting Domestic Animals' (U. S. Dept. Agriculture, 1896); Brauer, 'Monographie der Œstriden' (1863).

Ox-eye, a popular name for several composite plants, especially of the American genus. In America the name is most widely applied to *Heliopsis,* about ten species of which are distributed from Nova Scotia to Florida and westward to the Mississippi Valley. They are, with one exception, all perennials which bear abundant yellow flowers in the fall, but are not so popular in gardens as members of the genus *Helianthus,* the sunflowers. The ox-eyes of Europe are species of *Buphthalmum,* which are sometimes grown in America in hardy borders. They have large flower-heads with long yellow ray-florets, and resemble sunflowers. Being showy and of simplest culture they are worthy a place in gardens. In the New England States the name is given to the black-eyed susan (*Rudbeckia hirta*), and to the ox-eye daisy (*Chrysanthemum leucanthemum*). See DAISY.

Ox-gall, the bile of the ox, a greenish bitter fluid secreted by the liver of the animal. After being clarified it is suitable for various uses in manufactures and the arts, especially in the mixing of colors for water-color painting, its effect being both to increase their fluidity and to fix them. It is also used in medicine, either in concentrated mass or powdered after drying, as a stimulant to the flow of bile and as compensation for the lack of the secretion of bile. It is further useful in the form of enemas.

Ox-pecker. See BUFFALO-BIRD.

Ox-warble. See OX-BOT.

Oxalic Acid, a dibasic organic acid whose salts occur in various plants, and which takes its name from the occurrence of the acid potassium salt in common sorrel (*Oxalis acetosella*). Oxalic acid may be obtained by heating sawdust with a mixture of caustic soda and caustic potash. The immediate product is oxalate of soda, which may be obtained in granular form by exhausting the mass with boiling water, and evaporating the filtrate. To prepare the acid in the free state, the sodium oxalate is boiled with milk of lime, and the calcium salt so obtained is decomposed with sulphuric acid. Much of the commercial supply of oxalic acid, however, is obtained by the oxidation of sugar with nitric acid. Anhydrous oxalic acid may be obtained in the form of octahedral crystals, by allowing a solution of oxalic acid in sulphuric acid to stand for some days. The anhydrous acid has the formula COOH.COOH, or $H_2C_2O_4$, melts at 369° F., and absorbs water from the air, its crystals then falling into powder. The oxalic acid of commerce contains two molecules of water, crystallizes in the monoclinic system, and is readily soluble in water and in alcohol. The hydrated crystals give off their water of crystallization when heated to 212° F. or when allowed to stand for some weeks over concentrated sulphuric acid. The hydrated crystals bear a close resemblance to Epsom salts, with which oxalic acid is sometimes confounded, with fatal results. Heated to about 300° F., oxalic acid decomposes with the formation of carbon monoxide, carbon dioxide, water, and formic acid; a small quantity of oxalic acid also subliming, at the same time, without change. When heated with concentrated sulphuric acid, it breaks up into water, carbon monoxide, and carbon dioxide, the latter two gases being given off in equal volumes. Oxalic acid forms two series of definite, crystallizable salts, according as one or both of its typical hydrogen atoms are replaced. The neutral oxalate of ammonia is used, in the laboratory, as a reagent for the detection of lime, since it gives, with a salt of calcium, an insoluble, white precipitate of calcium oxalate. Neutral oxalate of potassium reacts with ferrous sulphate to form a double oxalate of iron and potassium, which possesses powerful reducing properties, and is used as a photographic developer. The acid oxalate of potassium (also known as salt of lemon, or salt of sorrel), is used for different purposes in the arts. Oxalic acid itself is used in calico-printing, and also in various bleaching processes, especially the bleaching of straw.

Poisoning by Oxalic Acid.—So commonly is oxalic acid used to polish kitchen boilers, etc., and to remove ink and fruit stains, that it is frequently mistaken for a "harmless powder." There is reason to believe that poisoning sometimes results from the frequent use of some cheap effervescent drinks in which citric acid is adulterated with oxalic acid. Oxalic acid is ranked as a corrosive poison, though, if taken in dilute solution, there may be no evidence of corrosion. The symptoms of this poisoning are heat and severe pain in the mouth, throat, and stomach, difficulty in swallowing, a sense of constriction, vomiting — perhaps of blood — muscular cramps, sometimes convulsions, and purging, in some cases attended with blood. The lips, mouth, and throat are at first red and swollen, then white. If the poisoning is severe the pulse is small and thready, there is a cold, clammy perspiration, then collapse, and, it may be, death from inanition. For treatment, first neutralize the poison by giving milk of lime, with a large

excess of hydrated lime, chalk, whitening, marble-dust, or even whitewash from the wall, if it can be obtained; then give a purgative dose of castor-oil, allay pain, and give stimulants if signs of collapse be present. Emetics are rarely needed and any liquid other than milk of lime should be sparingly used, if at all.

Ox'alis, a genus of herbs and shrubs of the natural order *Geranaceæ*. The species, of which there are about 200, are mostly natives of the warm parts of South America and Africa, but some are well known weeds, called wood-sorrel, in the north temperate zone; many have tuberous or bulbous roots. The genus is generally characterized by digitate or ternate compound, clover-like leaves which "sleep" at night or in very cloudy weather, that is, the leaflets assume a resting position at such times. The flowers generally close under similar conditions. The seeds, which are contained in a capsular fruit, are thrown to considerable distances when the fruit bursts open. Some of the tuberous species are used like potatoes; other kinds as salads; but the greater number are valued more for ornamental purposes than for food. They are largely cultivated in rockeries, borders, hanging baskets, window-gardens and greenhouses. They are readily propagated by divisions of the underground parts, and more slowly by seeds. They do best in well-drained, rich, sandy loam, those for winter blooming being started in early autumn; those for summer blossoming, in early spring, being transplanted to the garden as soon as danger of frost has passed. When frost is expected in the autumn the plants should be removed to a greenhouse or cellar and allowed to dry slowly. Those grown in the house or greenhouse may be allowed to dry gradually when they have ceased to bloom. When planting time again arrives the old soil should be removed and the clumps divided before being set in fresh soil.

The best known American species is the common wood-sorrel (*O. acetosella*). It is also a native of Europe and western Asia. Naturally it grows best in shady places and is often found covering the ground as thickly as grass, its little white, rosy-veined flowers appearing in abundance throughout the season. Except in such places the plant is rarely grown and even there it is generally regarded as a weed. Probably the next best known is the violet wood-sorrel (*O. violacea*), a native of the eastern United States. It inhabits similar localities but has pinkish violet flowers. Both species have an acid taste due to the presence of binoxalate of potash. The leaves are used to a small extent in the United States as a salad, but the former species is very popularly used in Europe, especially in Lapland.

Oxalu'ria, a morbid condition of the system, in which a prominent symptom is the presence of crystallized oxalate of lime in the urine. See URINE.

Oxenbridge, John, English colonial divine in America: b. Daventry, Northamptonshire, 30 Jan. 1608; d. Boston, Mass., 28 Dec. 1674. He was educated at Cambridge and Oxford, preached for a time in England and later in the Bermudas, whither he made two voyages, held a curacy at Beverley, was pastor of a church at Berwick-on-Tweed, held a fellowship at Eton from 1652 until ejected at the Restoration (1660), and as a preacher was driven from the exercise of his office by the act of uniformity. In 1669 he came to New England and on 4 May 1670 was ordained pastor of the first church at Boston. Anthony à Wood calls Oxenbridge a person "of a roving and rambling head," and "a strange hodge-podge of opinions"; but he is ranked in Boston Congregational annals as a pious and eloquent preacher, and a writer of considerable elegance. Among his works are: 'A Double Watchword' (1661); 'A Sermon at the Anniversary Election of Governor' (1672).

Oxenford, ŏk'sĕn-fôrd, **John,** English dramatist and critic: b. Camberwell, London, 12 Aug. 1812; d. London 21 Feb. 1877. He was educated for the law and admitted to the bar in 1833, but chose a literary career. He translated from the German several notable works, among them Goethe's 'Autobiography.' As a writer of both dramas and songs he gained considerable reputation and for 30 years preceding his death was dramatic critic on the London *Times*. Among his plays are: 'My Fellow Clerk' (1835); 'The Two Orphans'; 'Twice Killed' (1835); 'A Day Well Spent.'

Oxenham, ŏk'sĕn-ăm, **John,** English novelist. He was educated at Victoria University, Manchester, and was for some time resident in this country. Returning to England he gave up commercial pursuits in which he had been engaged and turned to literature. He has since published 'God's Prisoner' (1898); 'Rising Fortunes' (1899); 'A Princess of Vascovy' (1900); 'Our Lady of Deliverance' (1901); 'A Modern Masquer' (1901); 'John of Gerisau' (1902); 'Under the Iron Flail' (1902).

Oxenstierna, ŏks'ĕn-shār-nā, **Axel,** COUNT, Swedish statesman: b. Fanö 16 June 1583; d. Stockholm 28 Aug. 1654. He studied theology and later law at Rostock, Wittenberg and Jena; at 20 entered the diplomatic service of Charles IX.; was his minister to Mecklenburg in 1606; entered the senate in 1609; was head of the regency during the last days of Charles IX. and through the minority of Gustavus Adolphus; became chancellor of the realm in 1612; acted as regent during the prolonged absence of the king; effected the Peace of Stolbova with Russia (1617); and in 1626 was made governor-general of Prussia. After the death of Gustavus Adolphus at Lützen in 1632, Oxenstierna received almost unlimited powers, directed the league against Austria, and held it together for four years. He returned to Sweden in 1636 and became the leading spirit in the regency of Christina, using all efforts to bring about peace with Germany. The Peace of Brömsebro, concluded in 1545 as the result of negotiations undertaken by his son John, the Swedish plenipotentiary to Germany, was highly displeasing to the Queen. His obstinate opposition to Christina's plan of naming her own successor widened the breach between them, and he gradually withdrew from public affairs. Oxenstierna must be reckoned with Gustavus Adolphus as the leader of the Protestant League, and as a great and able statesman. The Swedish Academy of History and Antiquities is editing his correspondence (1888 sqq.). His greatest literary and political monument is the Constitution which he drew up in 1634.

Oxford, ŏks'fŏrd, England, a celebrated university city, the capital of Oxfordshire, 52 miles west-northwest of London (63½ miles

by rail), on an acclivity between the Cherwell and the Isis, a local name for the Thames. The rivers unite here and are crossed by several bridges, the principal of which are Magdalen Bridge over the Cherwell, and Folly Bridge over the Isis. In early times the city was surrounded by a wall; a considerable section exists, intact, in New College Gardens. The castle of Oxford, famous for the Empress Matilda's escape over the frozen Thames in 1142, has disappeared, but the keep, built in the time of Rufus, remains entire, and is included in the precincts of the prison. The principal street, colloquially "The High," has a length of about 1,000 yards, and its greatest width is 85 feet. It is adorned by several of the noblest structures of the city, including Brasenose, All Souls', University, Queen's, and Magdalen Colleges, St. Mary's Church, the new examination schools, and a fine bridge over the Cherwell, together with quaint old houses. The Botanic Gardens, dating from the 17th century, add to the beauty of the street.

The most interesting buildings are the colleges, component parts of the University of Oxford (see OXFORD, UNIVERSITY OF), but separate and distinct corporations, possessing property apart from the university. The buildings of the university proper are mainly situated between Broad and High streets. The most remarkable is the Bodleian Library, founded by Humphrey, Duke of Gloucester, built between 1444 and 1480, and restored by Sir Thomas Bodley about 1610. South of the Bodleian is the beautiful Radcliffe Camera, erected in 1749 to contain the books presented by Dr. Radcliffe to the university, but now used as a reading-room for the Bodleian. North of the Bodleian stands the Clarendon Building, built from the proceeds of Clarendon's 'History of the Great Rebellion.' It is the original home of the Clarendon Press, but now contains the offices of the registrar, etc., of the university. Westward of the library is the Sheldonian Theatre, designed by Wren, and presented by Archbishop Sheldon, a large semicircular chamber capable of seating 4,000 persons, and used by the university on great public occasions. The university also possesses the new Examination Schools; the Ashmolean Buildings, with the University Galleries and the Taylor Institution; the Science Museum, in the large and beautiful University Parks, by the side of the Cherwell, and close to the beautiful walk known as "Mesopotamia," which also belongs to the university; the Indian Institute; and the Botanic Gardens. New laboratories have been erected in proximity to the Science Museum, and the new schools are used for university lectures as well as for examination purposes.

The most remarkable of the buildings belonging to the various colleges are those of Christ Church. The great quadrangle is the largest in Oxford; the gateway was begun by Cardinal Wolsey, completed from designs by Wren, and contains the famous bell known as "Great Tom." Christ Church is also remarkable for its magnificent dining-hall and staircase, and its library, as well as for the cathedral. Not less interesting is Merton College, with its ancient chapel and the "Mob Quad," the earliest quadrangle in Oxford. New College, a perpendicular building of the late 14th century, is due to the munificence and to the architectural skill of the great prelate, William of Wykeham. Its chapel, cloister, and gardens are among the "sights" of Oxford, and its large quadrangle remains, except for the addition of a third story, much as it appeared to the founder's eye. Magdalen College is famous for its exquisite tower, the most beautiful of the "spires of Oxford," its chapel and cloister, and the Water Walks, known as "Addison's Walk." The buildings of All Souls' College are also rich in architectural association, and every college has some feature of peculiar interest. The chapel and garden buildings of St. John's, the library of Corpus Christi, Johnson's rooms at Pembroke, and the general effect of the quadrangles of Corpus, Oriel, Wadham, Balliol, and University, are illustrations of this. Modern additions to the architecture of Oxford have not been uniformly fortunate, and an occasional instance of vandalism (as in the destruction of the old porch at Oriel in 1897) is to be deplored. But the latest additions to Brasenose and New College and the Examination Schools are more worthy of the traditions of the university. Several of the colleges, notably Worcester, St. John's, Wadham, Merton, New College, and Trinity, have also beautiful gardens, and Christ Church possesses the great Broad Walk in the Meadow. Four colleges for women have been established, Somerville Hall, Lady Margaret Hall, St. Hugh's Hall, and St. Hilda's. Mansfield College (perhaps the most successful piece of recent building in Oxford), intended for the education of men for the Non-conformist ministry, was established in 1888; and buildings were opened in 1893 for Manchester College, removed from London in 1889. Notable buildings not connected with the university are the Corn Exchange; numerous schools; the Radcliffe Infirmary; the Lunatic Asylum, founded by Dr. Radcliffe on Headington Hill; the Martyrs' Memorial; the Bullingdon Barracks; the Pusey Memorial House, with its Chapel of the Resurrection; and the New Theatre.

Oxford is the see of a bishopric constituted at the Reformation. Christ Church, the cathedral church, originally belonged to the priory of St. Frideswide. Besides being the cathedral church of the diocese, it is also the chapel of Christ Church, but is of greater antiquity than this institution, having been built in the 12th century. The architecture is of the transition period between Norman and early English, and though the building is one of the smaller English cathedrals, its graceful and dignified interior gives it an important place in ecclesiastical architecture. The exterior, save the ancient spire, is hidden by the collegiate buildings. In the cathedral lie the remains of many eminent men, including Bishop Berkeley and Dr. Pusey. St. Mary's, used as a University Church, finely situated nearly in the centre of the High Street, is conspicuous by its richly decorated tower, terminating in a beautiful spire 180 feet high. It ranks as one of the finest Gothic structures of Oxford. The church of St. Martin's or Carfax, was removed in 1896 to afford more room at the crossing of the four great thoroughfares, High Street, Queen Street, St. Aldate's, and Corn Market. The ancient tower has been preserved. All Saints Church is a Queen Anne building in the classic style, of which it is an excellent example. St. Mary Magdalen presents several beautiful features, and has acquired much additional interest from the Martyrs' Aisle, added as a fit accompaniment of the Martyrs' Memorial, which stands close to it,

near the spot where Ridley, Latimer, and Cranmer suffered martyrdom. The most important of the other ecclesiastical edifices of Oxford are the churches of St. Aldate, St. Giles, St. Peter in the East, St. Thomas, and St. Barnabas, the chapel of Merton College, and the Roman Catholic Church of St. Aloysius. The Church of St. Peter in the East is very ancient, and possesses Saxon as well as Norman work; it has a large crypt. Several handsome churches have recently been erected: St. Philip and St. James and St. Margaret's in the north, St. Matthew's in the south, and St. Mary and St. John's in the east, the last served by the Cowley Fathers, an active Anglican brotherhood. The city contains also places of worship for Methodists, Independents, and Baptists. During the 19th century the city has been encircled by extensive residential suburbs. Less than two miles from Oxford stands, close to the river, the Norman Church of Iffley, one of the most perfect pieces of Norman architecture in England. The prosperity of the city depends mostly on the university, but a considerable trade is carried on in grain. The city is lighted by electricity since 1892, has a modern drainage system; and an excellent, improved, water supply. Pop. (1901) 49,413.

Oxford, Miss., city, county-seat of Lafayette County; on the Illinois Central railroad; 70 miles southwest of Corinth. It was built in 1836, but was burned during the Civil War. It is in a cotton-growing region, and has a cotton-gin and mill, and a cotton compress, also a planing mill, canning factory, and grist mill. It has two public graded schools, one for the colored race; it is also the seat of the State University of Mississippi, and of the Woman's College, founded in 1854 under the control of the Methodist Episcopal Church. Pop. (1890) 1,546; (1900) 1,825.

Oxford, N. C., town, county-seat of Granville County; on a northern branch of the Tar River, and on the Southern railroad, 35 miles north of Raleigh. It is in a fertile tobacco-growing region, has a large trade in tobacco, and contains several tobacco warehouses and manufactories, also a saw-mill, furniture factory, and an iron foundry. It has two orphan asylums, one for colored children, the other under the charge of the Masonic fraternity. It has no public high school (1903), but is the seat of the Horner Military School (non-sectarian) and of the Oxford Female Seminary (Baptist), founded in 1850, which has both secondary and collegiate departments. Pop. (1890) 2,907; (1900) 2,059.

Oxford, Ohio, village in Butler County; on the Cincinnati, Hamilton & Dayton railroad; about 35 miles north by west of Cincinnati. It is in an agricultural region and its chief industries are connected with farm products. It is noted as an educational centre; it is the seat of Miami University (q.v.), Oxford College (q.v.), and Western College (q.v.). Pop. (1890) 1,922; (1900) 2,009.

Oxford Clay, in geology, a term used by English geologists of the lower division of the Middle Oolitic (see OOLITE), making up with calcareous sandstones the Oxford (or Middle) Oolitic group, and so corresponding to one of the upper sections of the Jurassic. It is a blackish, brownish, or dark blue clay, rich in fossil ammonites and belemnites.

Oxford College, a college for women established in 1849 at Oxford, Ohio. Besides the regular collegiate work, there are courses in music and art, and provision for post-graduate work; there is also a preparatory department. The collegiate work is arranged in three courses, classical, literary, and scientific, leading to the degrees of A.B., B.L., and B.S. In 1902, the grounds and buildings were valued at $75,000; the students numbered 150 and the faculty 17.

Oxford Movement, a religious movement in the Church of England which originated among certain members of Oxford University. Its aim was the revival of religious life and doctrine in England on a purer and more primitive basis. The Church of England in the early part of the 19th century was in a condition in which reform was sorely needed. In many quarters religious life was stagnant, worldliness was rife, and the lower orders of the people had lost all taste for and sympathy with the services and ministrations of the established clergy. The fervid spirit of John Wesley and his successors had kept the spark of spiritual life still glowing in the heart of the masses, and the Roman Catholic Church as a consequence of Catholic Emancipation was rehabilitating itself. There were two main parties in the Church of England. There was the great Evangelical party who "whether they were admired as Evangelicals, or abused as Calvinists, or laughed at as Saints, were inheritors not of Anglican traditions, but of those which had grown up among the zealous clergymen and laymen who had sympathized with the great Methodist revival and whose theology and life had been profoundly affected by it" (Church). This party numbered many men of power among its ranks who kept alive the spirit of such pious and earnest leaders as Hervey, Romaine, Cecil, Venn, Fletcher, Newton and Thomas Scott. They trusted less in ordinances, or in ecclesiastical rites and traditions, than in the stirrings of the individual soul toward God, private study of the Scriptures, and constant prayer. They were generally disinclined to entertain anything like a scholastic theology, believing less in dogma than what they loved to speak of as "experimental religion."

In contradistinction to these Low Churchmen were the old-fashioned High Churchmen who had existed in the Established Church since the time of Laud. They clung to the learning of such theology as had become the heritage of the Church through the teaching of a line of solid divines from Hooker to Waterland. Bishop Wilson of Sodor and Man in his 'Sacra Privata' was their model of practical and personal devotion, but they also drew for their religious life upon the stores of Andrewes, Jeremy Taylor and Ken. They preached calm scholarly sermons, which embodied a gospel of common sense; some of them kept up daily service in the Church and advocated fasting. But there was a certain aristocratic aloofness in this party. They did not appeal to the heart of the middle or lower classes. Besides these two great parties there was rising in the Church a spirit of free thought which should afterward develop into the Broad Church party of Stanley and Jowett. Connop Thirlwall and Julius Hare

had become strongly tinged by the influence of recent German critical speculation and Whately, Hawkins and Milman were looking for a wider field of religious life and conviction which should be bounded neither by the conventionalities of the Evangelicals, nor the somewhat frigid dignity and strictness of the High Church party.

The two chief leaders in the movement which was to bring a new life into the English Church were men of the very highest gifts — John Keble and John Henry Newman. There were two sides to the spirit of this movement; one was theological, the other moral. As illustrating these two aspects of religious life it is impossible not to cite the 'Christian Year' which appeared in 1827 and embodied the essence of 'Tractarian' theology while it was warmed by the most pure and exalted ethical, if not ascetic, temper and tendency. When Newman began his ministry his sermons were remarkable for this same practical tone and his 'Holiness Necessary for Future Blessedness' was preached in 1826, before he was appointed vicar of Saint Mary's and struck the keynote of all his subsequent pulpit utterances. It was this intense moral earnestness that gave power and impetus to the new movement.

The political condition of England had much to do with the origin of the Oxford movement. The Reform Bill had just been passed and it looked as if the government were about to invade the rights of the Church. It was at this time that a sermon of Keble's seemed to fire the train. "On 14th July 1833," we read in Cardinal Newman's 'Apologia,' "Mr. Keble preached the assize sermon in the University Pulpit. It was published under the title of 'National Apostacy'. I have ever considered and kept the day as the start of the religious movement of 1833." The speaker described England as "a nation which had for centuries acknowledged as an essential part of its theory of government, that, as a Christian nation, she is also a part of Christ's Church, and bound, in all her legislation and policy, by the fundamental laws of that Church." He proceeds to charge the nation with now disavowing this principle, a course which implies "a direct disavowal of the sovereignty of God. If it be true anywhere that such enactments are forced upon the legislature by public opinion, is Apostacy too hard a word to describe the temper of such a nation?"

The effect of Keble's sermon was to cause a meeting at Mr. Hugh James Rose's parsonage at Hadleigh, Suffolk, between the 25th and 29th of the same July. Next in authority to Rose as leader in the movement (after Keble, Newman and Pusey) was William Palmer, and he has himself described the feelings with which the "Conspirators," as they were styled, met on that occasion. "We felt ourselves assailed by enemies from without and foes within. Our prelates — insulted and threatened by Ministers of State. . . . In Ireland — ten bishoprics suppressed. What was to come next? . . . We were overwhelmed with pamphlets on Church Reform. Lord Henley, brother-in-law of Sir Robert Peel, Dr. Burton, and others of name and influence led the way. Dr. Arnold of Rugby ventured to propose that all sects should be united by Act of Parliament with the Church of England. Reports were prevalent that some of the prelates were favorable to alterations in the Liturgy. Pamphlets were in wide circulation recommending the abolition of the creeds (at least in public reading) . . . the removal of all mention of the Blessed Trinity; of the doctrine of baptismal regeneration; of the practice of absolution." The party pondered over what was the best means of opening the eyes of Churchmen, and it was resolved at Hadleigh that this could only be done by writing, by publishing certain declarations, certain manifestoes, and thus to carry out the spirit of Keble's sermon. In this way were born what Mozley afterward called "that portentous birth of Time" 'The Tracts for the Times.'

The first Tract appeared 9 Sept. 1833. It was written by Newman. He wrote, as he says, under the conviction "that ancient religion had well nigh faded out of the land through the political changes of the last 150 years, and it must be restored." In the introduction he asserted the doctrine of Apostolic succession, and the ministerial power to give absolution. The early Tracts produced a profound sensation. They wakened men's minds, and in many quarters the cry was raised that they contained "Romanism" in disguise; yet they quoted the Prayer Book, and the most authoritative English divines and even bishops were puzzled how to regard them. They were supplemented by the 'Churchman's Manual' which explained the nature and claims of the Church and its Ministers. In the course of 1845 the party was joined by Edward Bouverie Pusey (q.v.) and he early contributed an elaborate tract on 'Fasting.' Between 1835 and 1840 the "Tractarians," as the promoters of the Oxford movement were called, had swollen to the dimensions of a large party. As a protest against its so called Romanizing tendency a monument was erected in Oxford to the martyrs of the Reformation Cranmer, Ridley and Latimer, but the "Memorial" had little effect in arresting the progress of the movement which was on its way to win the coming generation of English clergy to maintain the doctrines of Apostolic Succession, Baptismal regeneration, Priestly absolution, the real Presence in the Eucharist, and the Divine Character of the Church. But in a short time the authorities both of Oxford University and of the Church of England became alarmed. The Bishop of Chester, J. Bird Sumner, was the first to condemn the movement by denouncing in 1838 "the undermining of the Protestant Church by men who dwell within her walls . . . who sit in the Reformers' seat and traduce the Reformation." Yet the Tractarians undoubtedly made mistakes and showed impatience, exaggeration and little consideration for the scruples of those who did not accept their teachings. When the tract was published entitled 'On reserve in communicating Religious knowledge' they ventured on dangerous ground, and touched on topics not relevant to their main crusade, laying themselves open to the charge of avowing the principle of keeping back part of the counsel of God. But the formation of a "Romanizing" section in Tractarian party was not justifiably charged against them until the publication of Tract 90 in which Newman attempted to show that the 39 Articles of the Church of England could be so inter-

preted as to harmonize with the teaching of the Roman Catholic Church. This was the turning point in the history of the movement. The Tractarian doctrine was condemned by the Heads of Houses at Oxford. The bishop of Oxford forbade the publication of such views, and Newman yielded. The Tractarian candidate for the professorship of poetry, a man of undoubted genius, was defeated, and Mr. Ward, another Tractarian, dismissed from his mathematical lectureship at Baliol, and the climax was reached when Pusey was accused and found guilty of preaching doctrine contrary to that of the Church of England and was suspended from preaching within the University for two years. Finally a movement was set on foot to procure a vote of censure on Ward's 'The Ideal of a Christian Church' in which the Roman Catholic Church was set forth as that ideal, and the English Church condemned as not fulfilling it, was passed by a majority of 58 members of the vote of the Convocation, and only failed of being ratified by the Vice-Chancellor through the interposition of a legal technicality. On the 3d of October 1845 Newman requested the Provost of Oriel to remove his name from the books of the College and University and on the 8th of the same month he completed his 'Essay on the Development of Christian Doctrine'; two days afterward he was received into the Roman Catholic Church.

Newman was not the only one to leave the Church of England. A host followed him: Oakley, fellow of Baliol, Collyns of Saint Mary the Virgin's, Oxford; the poet F. W. Faber, rector of Elton; Gordon of Christ Church, Regents Park. By December 1846 150 clergymen and laity of the Church of England had entered the Roman Catholic Church.

The Oxford movement was a reaction from torpidity, ignorance and unspirituality in the English Church. Its results were at the time disastrous, but it has quickened religious life, stimulated theological inquiry and stirred up pastoral zeal and activity in the Establishment. The ritualistic movement has accidentally been the outcome of it, but Keble, Newman and Pusey were not ritualists, and on the whole the movement has done good from a Christian standpoint, in putting so prominently to the front Saint Paul's doctrine of the supernatural connection between the Church and its Head.

The practical result of the Oxford movement must indeed finally be looked to for the creation of a new spirit of earnestness and activity in the episcopate, and the formation of a new type of bishop, as exemplified in men like Samuel Wilberforce; in the revival of Gothic architecture and the multiplication of new church buildings; in the renaissance of ecclesiastical art, and the deepening of reverence and care in the details of public worship; in the founding of theological training schools, and the increased fervor and spiritual point in popular preaching; in the new taste for patristic learning, and in the zeal of local missions established in the slums of great cities, together with a long delayed recognition of the vast work done by John Wesley, and to some extent an imitation of his methods in reaching the hearts of the masses.

Consult: Church, 'The Oxford Movement'; Newman, 'Apologia'; 'Letters of John Henry Newman'; Palmer, 'Narrative of Events Connected with the Publication of Tracts for the Times'; Mozley, 'Reminiscences.'

Oxford University, England, at Oxford (q.v.), its foundation, by tradition, ascribed to Alfred the Great, who had a mint in the city, is believed to have its authentic origin in the quarrel between Henry II. and Becket, when the king, about 1164, directed an ordinance against the partisans of Becket, to the effect that all clerks possessing revenues in England and resident in Paris had to return in three months «as they loved their revenues.» Philip II. of France was aiding Becket, and Henry forbade English clerks to study at Paris. Just after this edict the schools of Oxford became very flourishing, and assumed the character of the contemporaneous university. The earliest public document known to exist which applies the title of university (*universitas*) to the schools of Oxford is one which dates from 1201. Some authorities assert that the university received its first charter as a corporate body in the reign of Henry III. (1216–72), while others represent that its first charter was that granted to it by Elizabeth in 1570, upon which its privileges depended until the passing of the Oxford University Act of 1854. The elective franchise was conferred upon the university in 1604, since which time it has returned two members to Parliament.

The collegiate system at Oxford dates from the 13th century. At first the students who congregated at the university had no special places of abode provided for them, but had to find accommodation for themselves. As the students found it cheaper to unite and rent a single house in which they might live together than to provide each for himself, they frequently did so, forming halls, hostels, or inns. Sometimes, for the sake of giving greater facilities to study, sums of money would be given or bequeathed to the university for the erection of buildings in which the students might live without any more expense than was necessary for their maintenance. The first who went further than this was William of Durham, who, dying in 1249, bequeathed a sum of money to the university to provide a permanent endowment for the maintenance of a certain number of «masters.» The first purchase was made in 1253, and with this purchase originated University College. There were two other colleges founded during the same century — Balliol College, between 1263 and 1268; and Merton College, founded at Maldon in Surrey in 1264, and removed to Oxford before 1274. This last college is said to have been the first in which the collegiate system in its modern form, or a form resembling the modern one, was instituted, the college being made a separate corporation, with a separate charter and separate statutes. The first statutes of University College as a separate corporation are dated 1280. At the beginning of the 14th century, while there were no more colleges than the three just mentioned, there were about 300 halls. As the number of colleges increased, and their growing endowments attracted greater numbers of students, the halls declined in numbers, especially since the attendance of students diminished in the centuries following the 14th. At the beginning of the

16th century the number of colleges had increased to 12, while that of the halls had sunk to 55. There are now 21 colleges, all of which are separate corporations, and, with two exceptions, have endowments for fellows and scholars. At Christ Church the fellows are distinctively called "students" (ordinary students being, of course, called undergraduates). All Souls' College has no scholars or undergraduates, except a small number of "Bible-clerks," and Keble College has no fellows. The fellows and scholars at Oxford hold pretty much the same position as at Cambridge (see CAMBRIDGE, UNIVERSITY OF, and FELLOWSHIP). Besides the colleges, there is one public hall, St. Edmund Hall. It is not a separate corporation, and has no endowments for fellows, and it will ultimately be absorbed by Queen's College, as St. Mary Hall has been incorporated with Oriel. The following are the names of the colleges according to their rank: University, Balliol, Merton, Exeter (founded 1314), Oriel (1326), Queen's (1340), New (1379), Lincoln (1427), All Souls' (1437), Magdalen (1458), Brasenose (1509), Corpus Christi (1516), Christ Church (1546), Trinity (1554), St. John's (1555), Jesus (1571), Wadham (1612), Pembroke (1624), Worcester (1714), Hertford, and Keble. The two last-mentioned date from last century. Hertford is the restoration of an old foundation, while Keble (which is an "institution" and not a college in the strict sense) was founded in 1868 for the education solely of members of the Church of England. There are also three private halls, governed by "licensed masters"; and since 1884 four colleges for women have been established, Somerville, Lady Margaret, Saint Hugh, and Saint Hilda's halls, although degrees are not conferred on women. The largest of the colleges is Christ Church, established in 1546 by Henry VIII., from funds collected by Cardinal Wolsey; it is commonly known as "the House" ("Ædes Christi"). In the 15th century an enactment was passed requiring all students who joined the university to become members of some college or hall, and this condition continued to be the law until 1868, when persons were permitted, under certain conditions, to enjoy the privileges of the university without so doing, keeping their statutable residence in approved houses or lodgings in the town. Those who avail themselves of this permission are called "unattached students." They have to pay slightly increased university dues, but are exempt from the heavy expenses attached to college life, such as "caution money," the cost of furniture, and large tutorial fees.

The constitution of the university is fixed by the act of 1854, which modifies that granted by the act of Elizabeth. The style or title by which the corporation is known is The Chancellor, Masters, and Scholars of the University of Oxford. The governing bodies are the House of Congregation, the House of Convocation, the Congregation of the University of Oxford, and the Hebdomadal Council. The House of Congregation is made up of the "regents," who are either *necessario regentes* or *regentes ad placitum*. The former include all doctors and all masters of arts for two years after the term in which they are admitted; and the latter, the professors, doctors resident in the university, heads of colleges and halls (variously known as master, president, principal, provost, or warden) or their deputies and censors, and deans of colleges, all of whom must, however, be members of Convocation to complete their qualifications as *regentes ad placitum*. The functions of this body are almost confined to ratifying the nomination of examiners by the vice-chancellor and the proctors, and to the granting of ordinary degrees. The House of Convocation is made up of both regents and non-regents, that is, of all who have been admitted to regency, provided their names have been constantly kept on the books of some college or hall, or of the delegates of unattached students. The functions of this body are numerous and important. It confers honorary degrees and others granted out of the usual course by diploma or decree; it elects to nearly all the offices in the gift of the university; it gives the final sanction to all new statutes; and it transacts all the formal business of the university as a corporate body, except what belongs to the House of Congregation. A residential qualification is necessary to membership in the case of the Congregation of the University of Oxford, except for certain official persons. Its business is almost entirely confined to legislation, but it also has the election of all the non-official members of the Hebdomadal Council. This last body consists of certain official and certain elected members. The official members are the chancellor, the vice-chancellor, and the two proctors. The elected members are: six heads of colleges or halls, six professors, and six members of Convocation of not less than five years' standing. The members of Convocation elected may be either heads of houses or professors. The election takes place once in three years. The elected members hold office for six years, and half of them are chosen on every occasion. They meet every Monday in term time (whence the name of the body), and when convoked by the vice-chancellor. All legislative measures originate with them.

The principal officers of the university are the chancellor, the high-steward, the vice-chancellor, the two proctors, the public orator, the clerks of the market, the keeper of the archives, and the registrar. The dignities of chancellor and high-steward are almost purely honorary, and are usually conferred on noblemen. The vice-chancellor, who is nominated by the chancellor from the heads of colleges, holds office for three years, and is now, in fact, the supreme executive and judicial authority of the university. The principal duty of the proctors is to maintain the discipline of the university.

There are about 100 professorships, lectureships, readerships, and teacherships in the University of Oxford, besides the lectureships, etc., in connection with many of the separate colleges. Most of the professors deliver lectures on the subjects for which they hold their professorships, but as attendance on these lectures is compulsory on none of the students, it depends greatly on the popularity of a professor, or the usefulness of his lectures for degree purposes, whether he has a large audience or not. But professorial work is increasing.

The old distinctions separating undergraduates into different classes (peers and their eldest sons, fellow and gentlemen commoners) have

disappeared. «Scholars,» however, wear longer gowns than ordinary students or «commoners.» Every student on entering his college is assigned to a tutor, who is responsible for the direction of his studies, and to whom he may apply for advice. The morning is devoted to attending lectures, or to private reading; the afternoon is universally surrendered to outdoor exercise; the evening, after «hall» (the common name for dinner), is given by reading men to their studies, as well as to the social and literary meetings which form so much of the charm of college life. There is a university club, known as the Union Society, in whose hall there is held a weekly debate on some public topic. There are also a dramatic club, and various musical societies which give performances regularly during term, besides many social clubs. The expenses of living at Oxford vary as the students; on the most economical system they cannot be brought below $800 per annum. The total number of undergraduates is about 3,400.

There are four terms in the university year at Oxford: Michaelmas term, which lasts from 10 October to 17 December; Hilary or Lent, from 14 January to the day before Palm Sunday; Easter term, from the Wednesday after Easter to the Friday before Whitsunday; and Trinity or Act term, from the day before Whitsunday to the Saturday after the first Tuesday of July; Michaelmas and Hilary terms are kept by six weeks' residence in each; and Easter and Trinity terms either by three weeks' residence in each, or by 48 days in both jointly.

The degrees conferred by the university are those of Bachelor and Master in Arts; Bachelor and Doctor in Music, Medicine, Civil Law, and Divinity; Bachelor of Letters and Bachelor of Science. The most important function of the university, however, is the conferring of degrees in arts. Twelve terms of residence are required for the degree of B.A., which must be taken before any other degree (except that of Bachelor of Letters and Bachelor or Doctor of Music) can be conferred. No further residence is necessary for any degree, and no residence whatever is required for degrees in music. Candidates for the degree of B.A. must pass three distinct examinations: Responsions (known among undergraduates as «Smalls») before the masters of the schools (six in number); first public examination (Moderations or «Mods») before the examiners known as moderators (in the classical school seven, in the mathematical three); and the second public examination (or «Greats») before the public examiners (six in the pass school, five in the school of *literæ humaniores,* and three, four, or five in each of the other seven honor schools, namely, mathematics, natural science, jurisprudence, modern history, theology, English literature, and Oriental studies). Candidates are admitted to pass Moderations at their fourth, or any subsequent term, and to a Final Pass School at their eleventh or any subsequent term. Honors may be obtained in each of the two public examinations. The first consists of an examination in Scripture, or an alternative Greek or Oriental book, and in either classics or mathematics for a pass or honors. Candidates are admitted to the honors examination only from the fifth to the eighth term from their matriculation, and are put to a much severer test than candidates for a mere pass. The successful candidates are arranged by the moderators according to merit in three classes, in each of which the names are published in alphabetical order — a feature of Oxford honor lists. In the second public examination honors are conferred in each of the eight honor schools already mentioned. Successful candidates are arranged by the public examiners in four classes according to merit, and their names published in these classes in alphabetical order. Candidates in the Pass School are examined in three subjects chosen from the following four groups: (1) Classics, classical history, Sanskrit, and Persian; (2) Modern languages and history, political economy, and a branch of legal study; (3) Mathematics and six branches of natural science; (4) Religious knowledge. Not more than two subjects may be chosen from any one group, but one of the subjects must either be classics (two books in Greek, or one Latin and one Greek), Sanskrit, Persian, or a modern language (either French or German, with composition and literary history). A B.A. may proceed to the degree of M.A. without further examination or exercise, in the twenty-seventh term from his matriculation, provided he has kept his name on the books of some college or hall, or upon the register of unattached students, for 26 terms. In the case of all other degrees (except honorary ones) some examination or exercise is necessary.

Affiliated colleges are: St. David's College, Lampeter (1880); University College, Nottingham (1882); Firth College, Sheffield (1886); and several colonial universities. Students accredited from these affiliated colleges are admitted to the Oxford public examinations after a reduced period of academical residence.

The University of Oxford possessed the patronage of few church livings in its own right, but through an act of James I., Roman Catholics are disabled from presenting to any ecclesiastical benefice and their rights within 25 of the counties of England and Wales are made over to this university, those in the other 27 counties being conferred on that of Cambridge. Many of the colleges possess considerable ecclesiastical patronage. There are between 30 and 40 scholarships and exhibitions in the gift of the university, besides those belonging to the various colleges and halls. Of international importance are the Cecil Rhodes scholarships, dating from 1902, each of the annual value of $1,500, to be held by students from every important British colony, and from every State and Territory of the United States of America. There are also several valuable prizes, such as the Stanhope, for a historical essay; the Newdigate, for an English poem; and the Gaisford, for composition in Greek prose and verse. The Radcliffe traveling fellowships are awarded to enable students of Natural Science to prosecute their studies abroad. Consult: Clarke, 'The Colleges of Oxford' (1891); Corbin, 'An American at Oxford' (1903); Fulleylove and Thomas, 'Oxford' (1904); A. Lang, 'Oxford Notes' (1879); Lyte, 'History of the University of Oxford' (1886); Rashdall, 'Universities of Europe in the Middle Ages' (1895); Goldwin Smith, 'Oxford and Her Colleges' (1895); the series of 'College Histories' and the 'University Calendar'; Hutton, 'Literary Landmarks of Oxford' (1903).

Ox'idase, any member of a certain group of enzymes, which are distinguished, as a class, by their power of inducing the direct oxidation of sugars and certain other substances. The chemistry of the oxidases is very imperfectly known, but the group appears to be widely distributed in the vegetable kingdom, and it probably plays an important role in the chemical changes that occur in the growing plant.

Oxide, in chemistry, a compound formed by the direct union of oxygen with a metallic base, or with an organic radical. The oxides may be classified, in a general way, as acid, basic, and neutral. An acid oxide is one which has acidic properties, or which combines with the elements of water to produce an acid. Sulphur trioxide, SO_3, is a familiar example of this class of oxides, as it unites directly with water to produce sulphuric acid. Basic oxides are those which have basic properties, or which are capable of uniting with acids so as to produce salts. Calcium oxide (lime), CaO, is of this character. Neutral oxides are those which are neither acid nor basic in any marked degree. The magnetic oxide of iron Fe_3O_4, is an example of this class. The oxides are also classified in accordance with the proportion of oxygen and base that they contain. When two oxides of the same base are to be distinguished, that which contains the more oxygen in proportion to the base is sometimes called the peroxide, the other being called the suboxide. CuO, for example, may be called copper peroxide, and Cu_2O copper suboxide. These particular terms, however, are not used as generally as formerly. The term protoxide is sometimes applied to a neutral oxide which contains a single oxygen atom in combination with one atom of a divalent base, or with two atoms of a monovalent base. An oxide containing one, two, three, four or five atoms of oxygen, is called the monoxide, dioxide, trioxide, tetroxide, or pentoxide of the corresponding base. Occasional departures from this simple rule will be met with in modern chemical nomenclature, but in such cases the anomaly is due to some peculiarity in the behavior of the oxide or to the difficulty of changing a name after it has once been definitely adopted, even though it be erroneous when judged by correct principles. The gas whose formula is NO, for example, is commonly known as nitrogen dioxide, as though its formula were N_2O_2. A sesquioxide is an oxide containing three atoms of oxygen to two of the base; the name being derived from a Latin word signifying "one and a half." Sesquioxide of iron, for example, has the formula Fe_2O_3.

Oxley, ŏks'lĭ, **James Macdonald,** Canadian author and lawyer: b. Halifax, Nova Scotia, 22 Oct. 1855. He was graduated from Dalhousie University, Halifax, in 1874, studied at Harvard in 1876–7; and was admitted to the bar in 1878. He practised law in Halifax in 1879–83, when appointed legal adviser in the Dominion department of marine and fisheries. He resigned from this office in 1891 and engaged in the life insurance business in Ottawa and Montreal. Beside 'Nova Scotia Decisions' (1880–3), he has written a long series of boys' books, such as 'Donald Grant's Development' (1892); 'Archie of Athabaska' (1893); 'In the Swing of the Sea' (1897); 'Fife and Drum at Louisburg' (1899); etc., and 'Lhasa at Last: a Journey to the Forbidden City of Tibet' (1900).

Oxus, ŏk'sŭs, **Amu, Amu Darya,** ä-moo' där'yä, or **Jihoon,** jē'hoon, a large river in Asia, formed by several small rivers which have their sources in the Pamir Plateau, one being the outlet of a lake 14,000 feet above sea-level. The course at first is winding, then northwest to the Sea of Aral, which it enters by several mouths, forming a large marshy delta. At one time this river flowed into the Caspian Sea. The Oxus is about 1,500 miles long and navigable for about 1,000 miles. A Russian railroad to Samarcand crosses the river by a long bridge.

Oxy-acids, according to older chemical usage, are acids which contain oxygen; those containing hydrogen without oxygen being called hydracids. Nitric acid, HNO_3, for example, was called an oxy-acid, while hydrochloric acid, HCl, was called a hydracid. The term oxy-acid is not often used in this sense at the present time, but organic acids which contain the radical hydroxyl, OH, are frequently called oxy-acids, or, more correctly, hydroxy-acids. The organic acids of the lactic acid series, for example, may be regarded as derived from those of the acetic acid series by the substitution of a molecule of hydroxyl for an atom of hydrogen, and they are therefore oxy-acids, or hydroxy-acids, according to the more modern terminology. Acetic acid, for instance, has the formula $CH_3.COOH$, and glycollic acid (which belongs to the lactic acid series) has the formula $CH_2OH.COOH$. Glycollic acid may therefore be regarded as oxy-acetic acid, or hydroxy-acetic acid, if considered as being derived by substituting OH for one of the hydrogen atoms of the methyl group in the acetic acid. Lactic acid itself may be regarded as hydroxy-propionic acid, the formula of propionic acid being $C_2H_5.COOH$, while that of lactic acid is $C_2H_4OH.COOH$.

Oxyace'tic Acid. See GLYCOLLIC ACID.

Oxygen, a non-metallic, gaseous element, discovered in 1774 by Priestley, who called it "dephlogisticated air." The name oxygen (Greek, "acid-forming") was given subsequently by Lavoisier, in the erroneous belief that this element is an essential constituent of all acids. Oxygen is one of the most abundant of the elements. It constitutes about one fifth of the bulk of the atmosphere (see AIR), where it exists in the free state, mixed with free nitrogen. Water is a compound of oxygen and hydrogen, eight ninths of it, by weight, being oxygen. Most of the rocks of the earth's crust are also rich in combined oxygen, and it is estimated that the crust, as a whole, contains from 40 to 50 per cent of its own weight of this element, the principal other elements present being silicon, calcium, and aluminum. Physically, oxygen is a colorless gas without odor or taste. It is slightly heavier than air, and Regnault found that one cubic decimetre of the gas, at 32° F. and under a pressure of 760 millimetres of mercury at Paris, weighs 1.4208 grams. By the application of a pressure of 3,000 atmospheres at ordinary temperatures, Amagat caused oxygen to become denser than water, although it was still undoubtedly gaseous in nature. The coefficient of expansion of ordinary oxygen, under a constant pressure of one

atmosphere, is given by Jolly as 0.0036743 (Centigrade scale). The specific heat of the gas at constant pressure, as compared with an equal weight of water, is given by Regnault as 0.2175; and Clausius gives 0.1551 as the corresponding value of the specific heat at constant volume. By the simultaneous application of great cold and pressure (see CRITICAL POINT), oxygen may be reduced to a transparent pale-blue liquid, which is markedly magnetic, and which boils at about 360° F. below zero, when exposed to the pressure due to 740 millimetres of mercury. Liquid oxygen has a density comparable with that of water, though it varies considerably with changes of temperature; and when cooled to a point that is something like 400° F. below zero, the liquefied gas freezes to a white solid.

Oxygen is a dyad element, and it combines directly with most of the other elements with the formation of compounds known as oxides (q.v.). It is also an essential constituent of multitudes of other compounds, both organic and inorganic; and from all points of view it may be said to be one of the most important elements in the entire known list. It is an active supporter of combustion, and in fact all of the familiar cases of combustion are merely instances in which oxygen is actively combining with other elements to form oxides. Oxygen has the chemical symbol O, and its atomic weight is 15.88 if that of hydrogen is taken as unity. The atomic weights being merely relative numbers, however, it is now more common to assume the atomic weight of oxygen to be precisely 16, in which case that of hydrogen is approximately 1.008. (See ATOMIC THEORY.) By taking O = 16 instead of O = 15.88, it is found that the atomic weights of most of the other elements are also more nearly expressible by integers — a circumstance which tends to simplify all exact chemical computations. The processes of animal life are necessarily accompanied by the gradual oxidation of the tissues of the body, this oxidation being effected within the tissues themselves by means of the oxygen absorbed by the blood from the air in the lungs. When pure oxygen is inhaled, the oxidation processes go on with abnormal activity, and a marked exhilaration almost amounting to intoxication is the result. Oxygen is somewhat soluble in cold water, so that lakes, streams, and the ocean itself, contain more or less of it in solution; and it is from this dissolved oxygen that fish and other marine creatures obtain the supplies that are needed for the normal oxidation of their tissues.

Oxygen may be prepared by the electrolysis of water, or, more conveniently, by heating a mixture of potassium chlorate and manganese dioxide. In the latter case the chlorate is decomposed with the liberation of oxygen gas, while the manganese dioxide apparently remains unaffected. The role of the dioxide is not well understood. Potassium chlorate evolves oxygen when heated alone, but the temperature at which the evolution takes place is much lower when the manganese dioxide is added. Various other methods are in use for the production of oxygen on a commercial scale, one of the most interesting of these being the barium process, which has been made practical largely through the labors of the brothers Brin. When barium monoxide, BaO, is gently heated in contact with air, it absorbs oxygen and passes into the form of a dioxide, BaO_2. The dioxide, so prepared, is then isolated and heated more strongly, whereupon it breaks up again into free oxygen and barium monoxide; the monoxide being thus caused, by indefinite repetitions of the process, first to absorb oxygen from the air at a low temperature, and then to give off the pure gas at a higher temperature. Although the fundamental idea of this process has been known for a long time, it is only in recent years that certain practical difficulties have been overcome, so as to make the process a commercial possibility.

Under the action of the electric spark, or the silent electric discharge, oxygen becomes partially converted into an allotropic form known as ozone, which has a density 50 per cent greater than that of ordinary oxygen. Ozone is also formed in the electrolysis of ice-cold dilute sulphuric acid, though ordinary oxygen is evolved at the same time. Ozone is bluish in color, and has a strong characteristic odor, which may often be noted in the vicinity of induction coils and other pieces of electrical apparatus that are giving off sparks. It is more magnetic than ordinary oxygen, and is also more active chemically. It possesses powerful bleaching properties, destroying many of the organic dye-stuffs and coloring matters. It also attacks and destroys rubber and other organic bodies that are not actively attacked by normal oxygen. When heated to 520° F. it becomes entirely converted into ordinary oxygen; and this conversion takes place explosively, with the development of a yellowish flame, when ozone is compressed suddenly, without permitting the heat developed by the compression to escape. When cooled to a temperature lower than 220° F. below zero, and subjected to a pressure of something over 100 atmospheres, ozone condenses into a dark-blue magnetic liquid. Traces of free ozone occur in the air of regions that are sparsely populated, but it can hardly be detected in city air, except during thunderstorms.

Medical Uses of Oxygen.— In medicine, oxygen is generally used by inhalation, either pure, or mingled with from one to four volumes of atmospheric air or of nitrous-oxide gas. It acts usually as a stimulant, increasing the force and velocity of the pulse, and is especially valuable in chronic bronchitis, pneumonia, and other affections where there is dyspnœa or asphyxia. It has also been used in chlorosis, albuminuria, dropsy, paralysis, and various other affections, but its effects have been often disappointing. In appropriate cases it may be given in from one to four gallons at a sitting, two or three times a day. But the gas must be pure, the reservoirs must have proper mouthpieces, valves, and stopcocks, and the products of respiration must not pass into the reservoirs. Oxygen in too large a quantity relaxes and debilitates the system, producing narcotism. It should not be respired in any great quantity except under the direction of a physician, or at least some person understanding its physiological action.

Oxyhæmoglobin. See HÆMOGLOBIN.

Oxyhy'drogen Light. See CALCIUM LIGHT.

Oxyrhynchus, ŏk-sĭ-rĭng'kus, ancient name of a town in Egypt, now known as Belmesa. It is at present nothing but a heap of mounds, which cover an area surpassed by few ancient Egyptian towns. These mounds have recently been opened and explored and have yielded rich finds in papyri, containing many precious treasures of lost classical and early Christian literature. The Greek papyri unearthed in 1903 include a 3d century fragment of the so-called "logia" or 'Sayings of Jesus,' such as were discovered in the same place in 1897. Among the Latin papyri is a fragment of the epitome of Livy's history covering Books 37–39 and 49–55. On the back of this papyrus is written the largest piece of the New Testament on papyrus yet discovered, namely, the Epistle to the Hebrews. Another fragment comes from the Septuagint version of Genesis — a century older than extant vellum manuscripts of the same book. Among other Greek papyri is a 1st century B.C. copy of an epinician ode, by a poetess, perhaps Corinna, the rival and reputed teacher of Pindar; epigrams by Leonidas, Antipater, and Amyntas; part of a philosophical dialogue in which the tyrant Pisistratus is one of the speakers; a long 2d century papyrus contained an invocation to a goddess, and on the back an account of a miraculous cure effected by Imhotep, the Asclepius of the Greeks, and the Æsculapius of the Romans.

Oxyrhynchus, the name given by the Greeks to a fish of the Nile (*Mormyrus oxyrhynchus*), formerly reverenced by the Egyptians, who refrained from eating it. It was sacred to the goddess Hathor, and is frequently represented on sculptures and coins. The Egyptians embalmed and buried the oxyrhynchus with great pomp. Its modern name is "mizdeh." See MORMYRUS.

Ox'ysalt, or **Oxisalt,** a salt of an oxy-acid. See OXY-ACIDS.

Oxyu'ris, a genus of small thread-worm parasitic in man. *O. vermicularis* is about one sixth of an inch, and the female about half an inch long, and inhabits the rectum of children and of old people in numbers, setting up inflammation. See NEMATODA; THREAD-WORM.

Oyer (oi'ẽr) **and Terminer, Court of.** See COURT.

Oyster Bay, N. Y., town in Nassau County, on the north coast of Long Island; on an inlet of Long Island Sound, and on the Long Island railroad; about 15 miles east of New York and 28 miles from City Hall. It is connected by steamers with New York and the large sound ports. Its name comes from its principal industry — cultivating oysters. Sea Cliff, a village, is in the town. It is a favorite summer residential town for New York business men. It is the home of President Roosevelt. The government is administered by town meetings held biennially. Pop. (1900) 1,558.

Oyster-catcher, a shore-bird of the plover family, several species of which constitute the genus *Hæmatopus*, characterized by lack of the hind toe. The bill is of great length, pentagonal at its base, slightly bent upward, and flattened or compressed at the apex, which is truncated. Oyster-catchers frequent both seacoasts and inland waters, picking up small mollusks, crustaceans, sand-worms, etc. They are 18 to 20 inches long, and their plumage is handsomely variegated with black, white and brown, so that the Old World species (*H. ostralegus*) is often called "sea-pie" in England. The familiar American species is *H. palliatus*. It is to be found in all parts of the country, but is rare northward of the middle parts. Consult: Elliot, 'North American Shore Birds' (1895); Sandys and Van Dyke, 'Upland Game Birds' (1902).

Oyster-crab, or **Pea-crab,** a small crab (*Pinnotheres ostreum*) which dwells inside of the shells of American oysters as a commensal (see COMMENSALISM). Other species inhabit other host-shells in various parts of the world, one associated with a Mediterranean *Pinna* being the subject of some pleasant classical legends. These small crabs are excellent eating, but the difficulty of getting them in any considerable quantity makes them a costly dainty.

Oyster-fish, a local name for the tautog (q.v.).

Oyster Plant, Vegetable Oyster, Salsify, or **Salsafy,** a biennial composite herb (*Tragopogon porrifolius*). When in flower it is about four feet tall, bears grass-like leaves and showy, purple flowers, which close before noon. It is a native of Europe, whence it has spread as a weed to many countries. The cultivated varieties are grown for their gray taproots, which are often a foot long and two inches in diameter, and which suggest the flavor of oysters. The seed should be planted in deep, rich, well-drained soil as early in the spring as the ground can be worked, the drills being 15 or 18 inches apart. The plants must be cleanly cultivated until their tops cover the spaces between the drills. In late autumn part of the crop should be dug, the remaining part being allowed to stay until spring. Freezing does not harm the roots; indeed, they are believed to be better flavored if so treated. The stored roots are very apt to shrivel, become tough and lose flavor. Cool, moist storage, or pits, should obviate this difficulty. The plant succeeds best in cool climates and should be in every home garden. As a commercial vegetable it is of far less importance than parsnips and carrots.

Oyster-shell Bark-louse. See SCALE INSECTS.

Oysters, strictly speaking, any species of the family *Ostræidæ* of lamellibranch mollusks, but sometimes the term is enlarged to include other somewhat similar animals, as the pearl oysters (family *Ariculidæ*). In the true oysters (*Ostræa*) the shells are irregular, the two valves being unequal and the hinge without teeth. The animal becomes attached to some submerged object by the left valve, which becomes hollowed out to receive the body, while the right valve, which is free, is flattened or may be even concave from above. The shells are closed by a single adductor muscle, which extends from about the centre of one valve, through the animal, to the other. The edges of the mantle are free from each other and are fringed upon the margin. The gills (called "beard" in cookbooks) are nearly equal, and the labial palpi are triangular. The oysters differ from any other lamellibranch in that the intestine does not run through the heart, while the foot is small or even entirely absent, a result of the sedentary life.

About 70 recent species of *Ostræa* are recognized, mostly inhabitants of the warmer seas. The most important species are the common oysters of Europe (*O. edulis* and *O. angulata*) and the *Ostræa virginiana* of the eastern coast of America. The first mentioned species occur from Norway and the Baltic to England and into the Mediterranean, another species of less importance (*O. adriatica*) taking their place in the eastern Mediterranean and the Black Sea. At one time *Ostræa virginiana* ranged along our whole eastern coast, from the Gulf of Saint Lawrence to the Gulf of Mexico, but since the growth of civilization there it has disappeared from the whole coast between Nova Scotia and Cape Cod. There still remain beds in the Bay of Chaleur and around Prince Edward Island. On the Pacific coast two species are eaten, *O. conchophila* of California and *O. lurida* of the coasts farther north. In the tropics species belonging to the subgenus *Alectryonia* become attached to the roots of the mangroves and are exposed at low tides; these are the so-called "tree oysters."

Oysters, like all other mollusks, reproduce exclusively by eggs. Our *Ostræa virginiana* has the sexes separate, but the European oysters are hermaphroditic. From the eggs there hatches out a small, free-swimming larva, which swims about until after the first appearance of the shell, and thus aids in the distribution of the species. After a few days this free life ceases and the young becomes attached, and is then known as "spat." It grows rapidly, feeding upon the microscopic life in the water which is conveyed to the mouth by the cilia covering all parts of the body, and especially the gills and labial palpi. When large enough for transplantation the young are termed "seed oysters."

As will be seen from the foregoing, the oyster needs some solid support upon which to attach itself, otherwise it would sink in the mud and become smothered. In nature this support is furnished by reefs of rock or by banks of old oyster shells, but in the artificial culture of oysters so-called "collectors" are made of branches of trees, either in their natural state or woven into bundles, or of tiles baked especially for the purpose. Upon these the spat collects, and when large enough to form "seed" are either removed for transplantation, or in the case of the tiles, the whole are placed in the beds in the best position for growth. When the oysters are collected from the tiles, the tiles are exposed for some time to the air, and are then painted with lime before being used again as collectors. Another very common form of collection, is to spread upon prepared spaces of bottom clean oyster shells, or pieces of coke, or other similar materials attractive to the spat.

In the United States about forty per cent of the oysters are obtained from the so-called natural beds, the remainder being from beds formed by transplanting the seed from the collectors to suitable spots, in some cases to points where the oyster will not naturally breed as in various parts of Massachusetts Bay. Several States have recognized the importance of the oyster business and have passed laws governing the control of the beds. In Europe, especially in England, France and Holland, the culture of oysters is pursued by a more intensive method than in this country; full information may be found in the publications of the United States Fish Commission.

Oysters are collected from the beds, whether natural or artificial, in two ways. In the shallower waters they are taken by means of oyster-tongs, which are like two long-tined rakes, hinged so as to open and close like shears. In deeper water (down to 15 or 20 fathoms) recourse is had to the dredge. This is a rectangular iron frame-work, about four feet across, with sharp edges, or with long teeth upon one side, while attached to the other is a large open-work bag of cord or iron. This dredge is dragged over the bottom, the teeth or sharp edges, tearing the oysters loose, when they are caught in the bag and brought to the surface.

The latest available statistics of oyster production are of different dates: For the South Atlantic and Gulf States, 1897; for New England and the Pacific Coast, 1899; for the Middle Atlantic States, 1901; for Europe, about 1890.

	Bushels	First Value
Massachusetts and Rhode Island.	558,603	$ 661,613
Connecticut	2,090,469	1,249,071
New York	2,312,778	1,972,540
New Jersey	3,609,131	2,257,685
Delaware	173,190	62,608
Maryland	5,685,561	3,031,518
Virginia	9,314,019	2,923,456
North Carolina	858,818	241,099
South Atlantic and Gulf States	3,132,955	892,614
Pacific Coast	519,340	971,829
Total United States	28,138,434	$14,313,753
Great Britain	2,760,000	6,200,000
Holland	70,000	444,000
France	2,000,000	5,000,000
Italy	65,000	200,000
Germany	13,000	75,000
Canada	152,580	183,846
Other countries	400,000	600,000

Ozark (ō-zärk') **Mountains,** a plateau region, from 1,200 to 1,800 feet above the sea-level, extending with gradual upliftings from the southern part of Illinois into Missouri, then sloping down enters Arkansas and Indian Territory and extends into Kansas. The highest point is Pilot Knob, in Iron County, Mo. The hills are in separate peaks or knobs, and not in continuous ridges. The irregularities which show mountain making processes as existing are not visible here; the Ozark Mountains or Ozark Plateau, belong with the oldest mountain regions of the world, and denudation is slowly and surely removing the last remnants of once lofty mountains. The plateau belongs to the Tertiary Period, but Pilot Knob and vicinity belong to the Palæozoic Age. North of the Ozark slope and south of the Mississippi River is an old flood plain. On the southern slope are large forests.

Ozena. See Nose and Throat.

Ozoce'rite, or **Ozokerite.** See Hatchettite.

O'zone, a colorless gas like oxygen, having a peculiar odor like that of air and a chemical activity. The density of ozone is one and one-half times that of oxygen and is charged into oxygen only at a high temperature. Ozone is found in country atmosphere to a much greater extent than in cities and towns. It is an intense purifier and is destructive to offensive odors.

P

P the sixteenth letter of the English and various other alphabets, is the sharp labial consonant pronounced when, the lips being closely compressed, they are separated by a forcible emission of the breath. Like *k* and *t*, it is a pure mute or surd, involving no action of the vocal chords: it differs from *b* in that *b* is sonant: with the same compression of the lips as in *p*, the effort to pronounce *b* produces a vocal sound within the oral cavity. The form of this letter, P, comes from the Latin alphabet: the same speech-element is called *pi* in Greek and its form is Γ, π while in the Greek alphabet our character P is called *rho*, equivalent to *r*. In early Phœnician writing the element *p* was represented by a vertical stroke curved or crooked to the left at the top (ϙ) : this form was also used in early Greek, but with the crook directed to the right, (ϼ): afterward the crook was made angular, (Γ), and finally the two downward strokes were made of one length (Π). In early Latin the *p* had the form (Γ), but this was changed to (Ρ) and finally the rounded form was adopted, P. The surd labial *p* is freely interchanged with *b, f* and *v*, for they are all of the class of labials and dentilabials.

Languages springing from a common original differ from one another in the preference they show for *p, b, f*, or *v*. The English language has very few words of Germanic origin beginning with *p*: such words in English are nearly all of Latin, Greek, or Celtic origin. In German very many words of Latin origin, as *palatinatus* (from *palatium*), *papa, palus* (stake), *persona* (parson), *pavo* (peafowl), *præbenda* (prebend), *piper* (pepper) become *pfalz, pfaffe, pfal, pfarrer, pfau, pfründe, pfeffer*, etc. The digraph *ph* was originally used by the Latins to represent the sound of the Greek letter *phi* (Φ, φ), which must have been different from the sound of the Latin letter *f*; else the Greek words *philosophia, pharmakon, phonaskos*, etc., would have been written *filosofia, farmacum, fonascus*, as the modern Italians write everywhere *f* for *ph*—*filosofia, fisica, Filomena*, etc. There are no native English words beginning with *p* followed by *n, s*, or *t;* but there are many such words of Greek origin: in those words the *p* is silent. The p between *m* and *t* in *attempt, contempt*, etc., is introduced to facilitate the utterance of the *m:* but in such words as *exemption* (exemshun), *redemption* (redemshun), etc., there is no need of this mediating *p* and it is silent in correct pronunciation.

Paca, pā'ka, **William,** signer of the Declaration of Independence: b. Wye Hall, Hartford County, Md., 31 Oct. 1740; d. there 1799. He studied at Philadelphia College, where he was graduated in 1758, and in the Middle Temple in London; practised law in Annapolis; became a patriot leader; was a member of the Legislature 1761 and 1771–4, of the committee of correspondence 1774, of the Continental Congress 1774–9, and of the State senate 1777–9. His career as judge began in 1778, when he became chief judge of the Maryland superior court; from 1780 to 1782 he was chief judge of the court of appeals for admiralty and prize cases. In 1782–6 he was governor of the State; in 1788 was a member of the State convention which ratified the Federal Constitution; and for the last 10 years of his life was United States district judge. His wealth and influence had been lavishly given to the Revolutionary cause, and he, more than any one man perhaps, overcame the opposition in Maryland to that cause.

Paca, a large agouti-like animal (*Cœlogenys paca*) of eastern South America, robust in form, with a broad, swollen head, caused by the great expansion of the zygomatic arches, and large eyes and ears. It is about two feet long, and a foot tall; the tail is a mere rudiment, and the color brown, marked with rows of oblong whitish spots. It lives near water, in which it is much at home, and digs shallow burrows in which a single young one is produced annually. It remains hidden by day, and seeks its plant-food by night, often making destructive forays upon plantations, especially of sugarcane. The flesh is edible, and the hide useful for leather. Two or three other less common species are recorded. Consult: South American authors, and Lydekker, 'Royal Natural History' (1895).

Pacaja (pā-kā-zhā') **Indians,** a South American tribe of the lower Amazon region, which formerly occupied a large part of the mainland near the island of Marajo. They lived in large villages and were mostly devoted to agriculture. Of recent years they have disappeared as a distinct tribe, having been absorbed by other native bands.

Pacay, pa-kā', a Peruvian leguminous tree (*Prosopis dulcis*) related to the mesquite. The pure white, flaky matter in which the seeds are embedded is used as food, and the pods, which are nearly 2 feet long, serve for feeding cattle.

Paccaritambo, pāk-kā-rē-tām'bō, or **Paccaritampu,** Peruvian cave south of Cuzco, on the Vilcamija River, reputed among the Incas as the place where Manco Capa and his brothers appeared first on earth, and styled "House of Dawn," in Quicha Paccaritampu.

Pacchiaroti, Giacomo, jä'kō-mō päk-kē-ä-rō'tē, Italian painter: b. Sienna 1474; d. France 1540. When a boy he showed a taste for devotional art and was placed in the studio of Bernardino Fungai, a Siennese artist of contemporary fame. In 1535 he headed a conspiracy against the government of the city and fled for his life to France, where he worked under De Rossi, the famous Italian painter, sculptor and architect, who had been invited to court by Francis I. Pacchiaroti's productions are distinguished for their coloring and technique and no paintings of the period are superior to them in strength of characterization and devotional tone. While his main works in fresco and oil are at Sienna, his 'Francesco d'Assisi' and 'Madonna and Child' in the Munich Pinakothek are among the gems of that collection.

Pace, a measu- of length, used as a unit for long distances. The Latin pace was measured from the mark of the heel of one foot to the heel of the same foot when it next touched the ground, thus stretching over two steps; while the English pace is measured from heel to heel in a single step. The Latin pace was somewhat less than 5 feet; the English military pace at the ordinary marching rate is 2½ feet, and at double quick time 3 feet. The pace is of course of little service as a unit of measure, except with disciplined troops who are always accustomed to take steps of equal length.

Pacer. See HORSE, THE; HORSE-RACING.

Pachacamac, päch-ä-kä'mäk, ruined city and temple in the district of the same name in Peru. The village now occupying the site is called La Mamacoma and is the terminus of a railway from Lima, 20 miles to the northwest; and is situated near the Rio de Lurin. The ancient city, a sacred city and quasi-Mecca of both the Incas and the earlier Yuncas, was devoted to Pachacamac, the supreme god and creator of all in the Yunca theogony, and in the time of the Incas to a temple of the Sun. The outlines of the old city are clearly visible; it had broad regular streets and its entire site, a lofty hill, was elaborately terraced. On its top was the temple of Pachacamac, about 200 yards long and 150 wide. A cemetery surrounds this temple and is very rich in remains of the pre-Incan civilization, especially household utensils, which were buried with the flexed corpses. The Inca convent on lower ground is an adobe building, 116 yards long and 67 wide, and contains 18 cells. The remains of tiny huts at the foot of the hill probably point to pilgrimages to these shrines, being no doubt inns for the entertainment of the pious visitor. Pizarro sacked the shrine in 1523, destroyed a wooden idol, and, it is said carried away 1,700 pounds of gold and 1,600 of silver. Consult: Squier, 'Peru' (1853), and Wiener, 'Pérou et Bolivie' (1880).

The district of Pachacamac is an administrative division of the province and department of Lima, with about 1,300 inhabitants. The same name is borne by an island off the coast of Peru near Lurin.

Pacheco, Francisco, frän-thēs'kō pä-chā'-kō, Spanish painter and writer on art: b. Seville 1571; d. there 1654. As a theorist in the art of painting Pacheco occupies a unique position in the history of the Seville School. His pictures are elaborate in their skilful embodiment of the principles he expounded in his 'Arte de la Pintura' (the Art of Painting), but they lack vigor and originality. His treatise, however, did much for art in Spain, and he was the master both of Alonzo Cani and Velasquez, the latter of whom became his son-in-law. In his 'Last Judgment' (painted for the nunnery of Saint Isabel) he introduced his own portrait, and ambitious and learned as many of his pictures are his small portraits, some of them in crayon, are among the best of his works.

Pacheco, Gregorio, Bolivian politician: b. Peru. He became prominent in the second half of the 19th century in the politics of Bolivia, where he was the owner of large plantations. In 1884–8, or for the entire legal period of four years, he held the presidency of Bolivia. He strove effectively to rehabilitate the commerce and industry of the nation, which had suffered through the war with Chile.

Pachmann, päH'män, **Vladimir de,** Russian pianist: b. Odessa 27 July 1848. He studied music with his father, an amateur violinist, and with Dachs at the Vienna Conservatory; made his first appearance in 1869; after eight years of retirement made his first tour; again retired for two years; in 1882–3 played successfully in Vienna, Paris, and London; came to the United States in 1890; and toured in 1899 and 1900. His strong personality shuts him out of all but solo music; in that field he is best known as an interpreter of Chopin.

Pachomius, pa-kō'mĭ-ŭs, **Saint,** Egyptian ascetic of the 4th century: b. Thebaid about 270; d. Proii, Egyptian Thebaid, 348. In early life he was drafted as a conscript in the army of Maximin, and at Thebes met with some Christians, whose teaching so interested him that on the conclusion of the campaign of Maximin against Constantine and Licinius he was baptized and embraced the life of an anchorite. His guide in his choice was Palemon, who accompanied him to Tabenna, an island in the Nile, where they took up their residence. In 326 he founded the first monastic community and he is spoken of by the learned Tillemont (see Tillemont, Sebastien le Nain de) as "the institutor not only of certain monasteries, but of the conventual life itself, and of the holy communities of men devoted to religious life."

Pachuca, pä-choo'kä, Mexico, administrative district of the state of Hidalgo; and the capital of the state, lying 55 miles northeast of the City of Mexico, in a mountain pass 8,000 feet above the sea, and at the end of a branch from the railroad between Mexico City and Puebla. It is the centre of the great Real del Monte mining district; and its mines, worked even by the Incas as well as steadily by the Spanish, are still very productive. A village called Pachuquilla, southeast of the city, is supposed to be older than the city; Humboldt and others claimed that it was the earliest Spanish settlement in Mexico. At Pachuca in 1557 Bartolomé de Medina discovered the method of amalgamation still in use in the Mexican mines. Pop. 40,000.

Pachyder'mata, the name formerly applied to a division or order of mammalia including the elephants, tapirs, hippopotamus, rhinoceros, swine, and hyrax — all of which forms were distinguished by their thick skin, by their non-

ruminant habits, and by their possessing more than one hoof on each leg. This classification has, however, given place to a more scientific and natural arrangement, in which the several forms are placed according to fundamental structural affinities. Thus the elephants form a distinct order, the *Proboscidea*. The rhinoceros and tapirs are included in the division *Perissodactyla* of the ungulate order; the hippopotamus and swine are arranged in the section *Artiodactyla* of the same order; while the hyrax has a separate order — *Hyracoidea* — to itself. See UNGULATA.

Pacif'ic Ocean, also formerly called the SOUTH SEA, the largest of the five great basins of the hydrosphere, extending for 133° of latitude and 180° of longitude, between the west coast of the North and South American continents, and the east coast of Asia and Australia. It exceeds in compass the whole of the four continents taken together, and occupies more than a third part of the earth's area. On the west it borders on the Indian Ocean, on the north it communicates with the Arctic Ocean by Bering Strait, on the south it is bounded by the Antarctic Ocean, and on the east it joins the Atlantic at Cape Horn. Within this enormous circumference it includes the numerous islands composing the groups of Australasia, Polynesia, Melanesia, and Micronesia, the islands on the west coast of America, and those on the east and south coasts of Asia. The Pacific Ocean is divided into — (1) the North Pacific, bounded on the south by the tropic of Cancer, and comprising in the north and west the Seas of Kamchatka and Okhotsk, the Japanese Sea, the East or North China Sea, and the Yellow Sea, and in the east the Gulf of California; (2) the Central Pacific, stretching between the tropics, and comprehending the greater part of the numerous and beautiful insular groups known by the collective name of Polynesia; and, (3) the Southern Pacific, or South Sea proper, extending from the tropic of Capricorn to the Antarctic Ocean, and not diversified by many islands. The Pacific Ocean receives most of its affluents from the Asiatic continent, the principal rivers being the Amur, Hoang-ho, and Yang-tse-kiang; while from South America, owing to the proximity of the Cordilleras to the coast, it receives no stream of any consequence, and from North America only the Yukon, Columbia, and the Rio Colorado.

The islands of this ocean are so numerous that it is difficult to give an enumeration of them, even in groups. Commencing on the American coast at the Strait of Magellan, and proceeding north, an uninterrupted chain lines the shores of Chile, and terminates in the large island of Chiloe. Many islets occur along the stretch of coast farther northward, and at the equator, about 700 miles west from the mainland is the interesting Galapagos group. Northward along the coasts of Mexico and the United States are the Revillagigedo, Alijos, Guadalupe, and several other small groups, while lining the coasts of Canada and Alaska is a chain of large islands, including among others those of Vancouver and Queen Charlotte. Turning west the Kodiak Archipelago lies at some distance off the east coast of Alaska, and the still larger chain of the Aleutian Islands, curving southwest from the extremity of that peninsula, and terminating the groups of the Pacific, so far as belonging to the American continent. On the opposite continent of Asia the islands commence with the Kurile chain, stretching southwest from the extremity of the Peninsula of Kamchatka, and afterward continued in the same direction by the far more important islands of Japan, the Philippines, and other large islands of the Indian Archipelago. In the south region of the Pacific, beyond the tropic of Capricorn, the islands are few in number, but include the important group of New Zealand. Between the tropics the principal groups are, north of the equator, the Hawaiian, Ladrone or Mariana, and Caroline Islands; and south of the equator, the Marquesas, Low Archipelago, Society, Friendly, Fiji, New Caledonia, New Hebrides, and Solomon groups.

The bed of the Pacific is composed largely of Red clay, with extensive sections of Blue and Coral muds, Globigerina, Radiolarian, Diatom and Pteropod oozes, and in the eastern portion and south of Australia and New Zealand is fairly regular, ranging from 1,000 to 2,000 fathoms in depth. In the north, northwest and the south, east of New Zealand are extensive deeps, the Tuscarora deep east of Kamchatka, the Kurile Islands, and Japan, having a depth greater than 4,000 fathoms, the Aldrich deep east of New Zealand, over 5,100 fathoms. Between Guam and Midway Islands (q.v.) the United States telegraph ship Nero in 1900 sounded a depth of 5,269 fathoms. See MOUNTAINS: OCEAN.

The general laws regulating winds, tides, and currents suffer fewer modifications in the Pacific, than in narrow seas. The tidal wave, commencing at the equator, diverges from it toward the poles, and, proceeding with great velocity, and without an obstruction, is scarcely perceptible among the central islands of the Pacific. Hence in the Low Archipelago, at Bow Island and Tahiti, the rise is only 1 foot, and at the Sandwich Islands 2 feet. It is only when, by the proximity of a mainland diminishing the depth of the water, or by any similar cause the natural course of the wave is changed, or obstacles to its progress are interposed, that an accumulation takes place, and high tides are formed. In the Pacific, however, these never attain the maximum heights for which some parts of the Atlantic and Indian Oceans are celebrated. In the solitary instance of Cook's Inlet, Alaska Territory, the rise is as high as 28 feet; but on all the west coast of America it is usually below 10 feet, and only in the Bay of Panama varies from 13 feet to 15 feet.

The prevailing winds of the Pacific, like those of other great seas, are divided into regular or trade winds and variables. The trade winds of the Pacific are not so regular in their limits as those of the Atlantic, and this irregularity extends over a much wider region in the case of the southeast trade wind than in the case of the northeast. The cause of this is the greater number of islands in the South Pacific Ocean, which, especially in the hot season, disturb the uniformity of atmospheric pressure by local condensations. The northeast trade wind remains the whole year through within the northern hemisphere. In the middle of summer (about July) the zone within which it blows extends from about the Mariana or Ladrone Islands, in 146° east longitude, to near the

coast of North America (Lower California), and its southern limit begins to the south of the islands mentioned, in about latitude 13° north, gradually descends toward the east to about 8° north, and then rapidly rises again to about 20° north, near longitude 115° west. In winter (about January) this zone extends from Borneo and the Philippine Islands to the American coast; and its southern limit, beginning about the northeast of Borneo, keeps between 2° and 4° north latitude until about longitude 170° west, when it gradually rises to about 10° north latitude, at about 100° west longitude. The southeast trade wind, on the other hand, advances beyond the equator, both in summer and winter, still preserving its original direction; in summer (July) to about 7° or 8° north latitude, and in winter (January) to about 5° north latitude, at 160° west longitude. In July the zone of this trade wind extends from New Guinea and Australia to the neighborhood of the South American coast; and its southern limit, beginning off the coast of Australia, about latitude 24° south, gradually rises to about latitude 16° south, at longitude 130° west, and then sinks again to about latitude 24° south, off the coast of South America. In January, on the other hand, the western limit of the southeast trade wind is about longitude 175° west; and its southern limit, commencing there about the equator, sinks gradually till it touches the Marquesas Islands, and then more rapidly till it reaches about 33° south latitude, off the South American coast. In the region lying to the west of this zone, and stretching from New Guinea and the Solomon Islands southeastward, there are no regular winds. West winds, accompanied by rains, here alternate with calms. Sometimes also irregular warm, moist winds reach this region from the north, but the regular northeast trade wind never visits it. The zones of the two trade winds are separated by regions of calms and of light winds, the limits of which vary of course with the varying limits of these zones. In the Chinese seas the terrible typhoon occasionally rages, and may occur at any season of the year.

The following table exhibits the mean velocity of the currents of the Pacific Ocean in 24 hours:

South Pacific Ocean

Southern equatorial current	24	miles.
Cross current	20	"
Current of Cape Horn	18	"
Humboldt's current	15	"
Current of Mentor	16	"
General current of Australia	12	"
Periodical currents of Australia	6 miles near the land. 16 miles at sea.	

North Pacific Ocean

Northern equatorial current	30	miles.
Equatorial counter current	15	"
Monsoon current of the Carolines	3	"
Japan current	31	"
Current of N. W. coast of America	16	"
Current of Kamchatka	8	"
Bering's current	14	"

The periodical current of the west coast of Mexico, occasioned by the monsoons of this coast, resembles them in its alternations. It extends from Cape Corrientes to the Cocos Islands, preserving a nearly uniform breadth of 350 miles. It was first noticed by Humboldt. See Ocean Currents.

The Portuguese were the first Europeans who entered the Pacific, which they did from the east. Balboa, in 1513, discovered it from the summit of the mountains which traverse the Isthmus of Darien. Magellan sailed across it from east to west in 1520–1. Drake, Tasman, Bering, Anson, Byron, Bougainville, Cook, Vancouver, Lapérouse, and others, traversed it in different directions in the 17th and 18th centuries. The domination of the Pacific is a political problem of international importance, which is agitating the civilized world at the commencement of the 20th century, and one in which the United States as a commercial factor figures prominently. Consult: Burney, 'Chronological History of Discoveries in the South Sea'; Colquhoun, 'Mastery of the Pacific'; Thomson and Murray, 'The Challenger Expedition' (1880–95).

Pacific Railroads. See Railroads.

Pacific University, established in 1854, at Forest Grove, Ore., under the auspices of the Congregational Church. The collegiate department confers the degrees of bachelor of arts, bachelor of science, and bachelor of letters; there is also a normal course and a preparatory department. The university is coeducational. In 1903 the grounds and buildings were valued at $85,000; the productive funds amounted to $198,000; and the annual income was $16,948. The library contained 10,800 volumes; the students numbered 211 and the faculty 14.

Pacif'icus, a pseudonym of Alexander Hamilton, under which, in 1793, he published a series of letters advocating the neutrality of the United States as between the European countries then at war. To these letters Madison replied in a series of five essays signed "Helvidius."

Pacing. See Horse-racing.

Pacin'ian Corpuscules, or **Pacinian Bodies** (also called corpuscles of Vater), elliptical, concentrically striated bodies of cellular tissue, capillary vessels, a watery fluid, granular material, and epithelioid cells; first described by Filippo Pacini in 1840. Into each corpuscle runs the axis-cylinder of a nerve (probably covered by the sheath of Schwann), terminating in a bulbous enlargement, or bifurcating, each nerve-fibral has a similar terminal knob. These corpuscles are the "peripheral end-organs" of certain sensory nerves and in the human being are found chiefly in the subcutaneous tissue of the palms of the hands and the soles of the feet, but have been found also in the genital organs, the nipples, and other portions of the body.

Packard, păk'ard, **Alpheus Spring,** American zoologist: b. Brunswick, Maine, 19 Feb. 1839. He was graduated from Bowdoin in 1861; and was for three years a special student under Agassiz at the Lawrence Scientific School, Harvard University. From 1865–6 he was librarian and custodian of the Boston Society of Natural History; and from 1867–78 curator, and then director, of the Peabody Academy of Science. In 1871–3 he was State entomologist of Massachusetts; from 1877–82 he was a member of the United States Entomological Commission and took part in several of the expeditions for scientific study under the charge of this commission. In 1878 he became professor of zoology and geology at Brown University. His most important contributions to science have related to the classification and anatomy

of the arthropoda, especially insects; he proposed a new classification of insects, and regrouping of the phyla of the arthropoda. As an evolutionist he is one of the founders of the Neo-Lamarckian school, to which he gave that name. His writings include: 'Guide to the Study of Insects' (1869); 'The Mammoth Cave and its Inhabitants,' with F. W. Putnam (1872); 'Our Common Insects' (1873); 'Life History of Animals' (1876); 'Half Hours with Insects' (1877); 'Injurious Insects of the West' (1877); 'Development and Anatomy of Limulus Polyphemus' (1885); 'Entomology for Beginners' (1888); 'Text-book of Entomology' (1898); 'Lamarck, the Founder of Evolution, his Life and Work' (1901). He was one of the founders and for 20 years editor-in-chief of the 'American Naturalist.'

Packard, John Hooker, American physician: b. Philadelphia 15 Aug. 1832. He was graduated from the University of Pennsylvania in 1850; was acting surgeon in the United States army 1861–5; and surgeon to the Episcopal Hospital, Philadelphia, 1863–84. He was also surgeon to two other hospitals in his native city, the Pennsylvania (1884–96), and the Woman's (1876–7). He published: 'Minor Surgery'; 'Lectures on Inflammation'; 'Operative Surgery'; etc.

Packard, Silas Saddler, American educator: b. Cummington, Mass., 28 April 1826; d. New York 10 Oct. 1898. He was educated at the Granville Academy, Ohio, and engaged in teaching at 17. He originated an admirable system of commercial training and in 1858 organized with Bryant and Stratton a business college in New York, which later became the Packard Commercial School. He founded the 'Niagara River Pilot' in 1853 and edited it until 1856, and in 1868–70 published 'Packard's Monthly.' He was president of the congress of business education at the World's Fair in 1893, and author of numerous text-books, among which are: 'The Packard Manual of Bookkeeping and Correspondence'; and 'The Packard Arithmetic.'

Packer, păk'ĕr, **Asa,** American capitalist: b. Groton, Conn., 20 Dec. 1806; d. Philadelphia 17 May 1879. He worked at the trade of tanning, then as apprentice to a carpenter, went to Pennsylvania in 1822, and in 1833 took charge of a boat on the Lehigh Canal, and later connected himself with coal-mining and the transportation system between Pottsville, Pa., and New York as a builder of locks and boats for the canal system. In 1844 he was a member of the Pennsylvania legislature. The Lehigh Valley Railroad was projected by him, and was completed from Mauch Chunk to Easton in 1855. As a Democrat he served two terms in Congress (1853–7). Out of the great wealth which he acquired he made many generous public gifts, the founding and endowment of Lehigh University (q.v.) being his most conspicuous benefaction.

Packer Collegiate Institute, a secondary schools for girls, located in Brooklyn, N. Y. It was chartered in 1853, and opened to students in November 1854; it stands on the site of the building of Brooklyn Female Academy (founded 1845), which was burned in December 1852. The work of the Institute is in four departments, primary, preparatory, academic, and collegiate; the primary work is in two grades, the preparatory in four, and the academic and collegiate in three. Though the Institute is a high school and confers no degrees, the work of the collegiate department overlaps the first two years of a regular college course, including in its curriculum logic, first two college years of Latin and Greek, psychology, advanced physics, and calculus. On entering the academic department, a student may choose one of two courses of study, with further privilege of choosing among elective studies in the collegiate department. Students are not ordinarily permitted to take more than three regular studies at a time. The Institute has a library numbering over 8,000 volumes (in 1903), well-equipped science laboratories, and a gymnasium in which instruction in physical training is given. It is not endowed; the Alumnæ Association (organized 1886) in 1902-3 began the attempt to raise a $100,000 fund for a new building to adjoin the original building. The students in 1903 numbered 621. Of these the great majority in all departments were from Brooklyn, as no attempt is ever made to attract students from outside the city. The Institute has long ranked among the first of the schools of its grade, and has had important influence on the educational life of Brooklyn.

Packing Industry. The packing industry is usually considered as applying more particularly to the curing and packing of hog products; but this business also includes the slaughtering, dressing, and shipping of cattle and sheep, although it is true that only a small percentage of the product from the cattle and sheep is "packed," using the term in its most literal sense.

As to the history of the packing industry, it is said that pork was cured and packed in barrels in Salem, Mass., in 1640, and it is certain that, about 1690, Boston did quite a trade in that line; but the paternity of the Western packing business, as we understand it to-day, belongs to Cincinnati, where, in 1818, one Elisha Mills was established. The first drove of hogs ever received in Chicago was in 1827. But no attempt at packing was made before 1832, when George W. Dole packed some pork for Oliver Newbury, of Detroit. In the forties hogs were packed at Columbus, Chillicothe, Circleville, and Hamilton, in Ohio; Lafayette, Lawrenceburg, Madison, Terre Haute, and Vincennes, in Indiana; Alton, Beardstown, Pekin, Peoria, and Quincy, in Illinois; and many places of minor importance. The greatest number of places engaged in the hog-packing business was reported in 1873–4, 397 places being included in the official reports; since that time the number has steadily declined, the process of concentration in the large centres going steadily on, the number in 1899–1900 being only 53.

The first season in which the Western packing reached a total of 1,000,000 hogs was in 1843–4, the number falling below this point during the next three years. The table at the top of the following page shows the number of hogs packed in the West up to the beginning of summer slaughtering operations.

Prior to 1872 summer slaughtering had not reached proportions of importance. In that year 500,000 hogs were killed during the season, and subsequently, with the introduction of chilling processes, summer killing developed largely, as

HOGS PACKED.

Year	Number Packed	Year	Number Packed
1842–43	675,000	1857–58	2,211,000
1843–44	1,245,000	1858–59	2,465,000
1844–45	790,000	1859–60	2,351,000
1845–46	940,000	1860–61	2,156,000
1846–47	825,000	1861–62	2,893,000
1847–48	1,710,000	1862–63	4,069,000
1848–49	1,560,000	1863–64	3,261,000
1849–50	1,652,000	1864–65	2,423,000
1850–51	1,333,000	1865–66	1,788,000
1851–52	1,183,000	1866–67	2,401,000
1852–53	2,201,000	1867–68	2,781,000
1853–54	2,535,000	1868–69	2,500,000
1854–55	2,124,000	1869–70	2,635,000
1855–66	2,490,000	1870–71	2,695,000
1856–57	1,818,000	1871–72	4,831,000

is shown by the following comparison of yearly totals for the summer and winter seasons and the aggregates:

Year	Summer	Winter	Twelve Months
1872–73	505,000	5,410,000	5,915,000
1873–74	1,063,000	5,466,000	6,529,000
1874–75	1,200,000	5,566,000	6,766,000
1875–76	1,262,000	4,880,000	6,142,000
1876–77	2,308,000	5,101,000	7,409,000
1877–78	2,543,000	6,505,000	9,048,000
1878–79	3,378,000	7,480,000	10,858,000
1879–80	4,051,000	6,950,000	11,001,000
1880–81	5,324,000	6,919,000	12,243,000
1881–82	4,803,000	5,748,000	10,551,000
1882–83	3,211,000	6,132,000	9,343,000
1883–84	3,781,000	5,402,000	9,183,000
1884–85	4,059,000	6,460,000	10,519,000
1885–86	4,964,000	6,299,000	11,263,000
1886–87	5,644,000	6,439,000	12,083,000
1887–88	5,611,000	5,921,000	11,532,000
1888–89	5,315,000	5,484,000	10,799,000
1889–90	6,881,000	6,664,000	13,545,000
1890–91	9,540,000	8,173,000	17,713,000
1891–92	6,696,000	7,761,000	14,457,000
1892–93	7,757,000	4,633,000	12,390,000
1893–94	6,721,000	4,884,000	11,605,000
1894–95	8,812,000	7,191,000	16,003,000
1895–96	8,195,000	6,815,000	15,010,000
1896–97	9,980,000	6,949,000	16,929,000
1897–98	11,760,000	8,441,000	20,201,000
1898–99	13,900,000	9,720,000	23,620,000
1899–1900	13,535,000	8,676,000	22,211,000

The summer season covers the period from March to October inclusive, and the winter season, November to February. For the past ten years the summer packing represents about 58 per cent of the aggregate. It is here shown that from a business of less than 1,000,000 hogs, as the yearly extent of Western packing operations in 1845, the growth of this industry brought the annual average for the following decade to 1,606,000, during which period the largest total was 2,535,000, in 1853–4; for the next decade, 1855–6 to 1864–5, the annual average was advanced to 2,613,000 hogs, the largest number being 4,069,000, in 1862–3; for the following decade, 1865–6 to 1874–5, the annual average reached 3,993,000 hogs, with 6,766,000 as the largest number, in the last year of the period; for the next decade, 1875–6 to 1884–5, there was a more striking advance, the annual average representing 9,015,000 hogs, with 12,243,000 as the largest yearly number, in 1880–1. Again a large increase is shown for the past decade, ending with 1899–1900, for which the annual average is 17,200,000, and 23,620,000 the largest yearly number, in 1898–9.

For the ten years ending with 1851–2 the packing at Cincinnati represented 27 per cent of the total for the West, that city reaching 475,000 hogs in 1848–9. Railroads penetrated the West in 1852, and by 1855 several roads were in operation. This influence, tending, as it did, to open up the country to settlement, and facilitating the exchange of commodities, had a marked effect on the extension of the packing business, and in changing its geographical position and its character. At Chicago about 20,000 hogs were killed in 1850–1, and the increase at this point from that time on was rapid. In 1858–9, 99,000 hogs were killed in Chicago; 505,000 in 1861–2; 1,225,000 in 1871–2; 4,009,000 in 1877–8; 5,752,000 in 1880–1; in 1890–1, 6,071,000, and in 1899–1900 7,119,440. The largest yearly total for one city in the history of the industry was that of Chicago for 1898–9 amounting to 8,016,675, Kansas City coming second with 3,107,053 in the same year. Until 1861–2 Cincinnati maintained its position as the leading packing point in the country. In that season the distinction passed to Chicago, where it has since remained. Of the aggregate of 170,200,000 hogs handled by Western packers between 1890 and 1900, Chicago packed over 58,000,000, or about 35 per cent. During the same time Western packers paid out $1,663,330,000 for hogs, or an annual average of about $166,000,000, reaching $212,850,000 for the year ending 1 March 1899. These figures relate only to the manufacture of hog products, and to the business in the West prosecuted for commercial purposes. For slaughtering and packing in general the relative supremacy of Chicago is the same. Of products valued at $698,206,548 for the entire country for the year 1899, Chicago contributed 35.6 per cent, or $248,811,997 worth. Kansas City was second, with 10.5 per cent, and a total of $73,205,027.

While curing operations were carried on in Eastern markets at an earlier period, what may be termed regular packing establishments probably were not established there until after the industry had been developed in the West. The following is a statement of the reported sales of beef-cattle, sheep, and hogs at Boston, New York, Philadelphia, and Baltimore, in the year 1844, most of these animals being undoubtedly slaughtered for local consumption in a fresh state:

ANIMALS SOLD IN FOUR EASTERN CITIES IN 1844.

	Cattle	Sheep	Hogs	Total
Boston	43,530	98,820	43,530	185,410
New York	49,002	75,713	13,478	138,193
Philadelphia	37,420	91,480	22,480	151,380
Baltimore	33,500	90,450	24,000	147,950
Total	163,452	356,463	103,018	622,933

The aggregate value of the 623,000 animals marketed in the four large cities in one year, fifty years ago, was $7,500,000. For the year 1899 the receipts of cattle, sheep, and hogs at Boston, New York, Philadelphia, and Baltimore were as follows:

ANIMALS SOLD IN FOUR EASTERN CITIES IN 1899.

	Cattle	Sheep	Hogs	Total
New York	955,463	1,883,081	1,735,215	4,573,759
Boston	189,107	374,785	1,680,834	2,244,726
Philadelphia ...	123,810	363,449	311,869	799,128
Baltimore	157,542	324,371	827,873	1,309,786
Total	1,425,922	2,945,686	4,555,791	8,927,399

The total value of the 8,927,399 animals represented in the foregoing exhibit for 1899 was approximately $135,000,000. There were exported 409,176 live cattle, valued at $30,685,461, leaving approximately 8,500,000 animals for local slaughtering establishments at the seaboard, and representing about $105,000,000 in value. For many years a number of large packing establishments have been in operation in Eastern cities, notably at Buffalo, Boston, Providence, New Haven and Springfield. At about 50 establishments in New England, New York, and Pennsylvania from which returns of packing have been obtained, the total packing for the year ending 1 March 1899 was 3,100,000 hogs. The total of these establishments ten years ago was 2,338,000, which exceeded any previous year. The hogs slaughtered the past year at the seaboard and other Eastern localities represented a value of about $55,000,000, which with the amount paid out by Western packers makes a total of $267,000,000 for the year's outlay for hogs, or an average of about $900,000 daily.

These statistics indicate in general terms the significant progress of the pork-packing industry in the United States, which we may say really had its beginning about 80 years ago. Naturally, labor-saving devices have been adopted as pressing needs demonstrated their necessity. The killing is done by hand, no mechanical means of wholesale slaughter having been evolved; but in the manipulation of the carcass many ingenious contrivances are utilized. As soon as life has left the animal he is hooked by the nose to an endless chain, passed through the scalding-vats, and through an automatically adjustable scraper, where he is deprived of hair and bristles in a few seconds; he is then hoisted, head down, upon an inclined rail; and is disemboweled, beheaded, washed, trimmed, and whirled off to the chill-rooms at the rate of one every three seconds. The cutting and curing of the hog, too, is different from the custom of early days. No one factor has done more to render possible the development of the last 30 years in the slaughtering, curing, and packing of meats than the discoveries securing and improving artificial refrigeration. At the bottom of all successful meat curing lies the proper and thorough chilling of the carcass. The packing season is now twelve months long, and summer-cured meat differs in no material respect from that cured in winter.

Beef packing was among the earliest of operations in the curing of meat for transportation to other localities, as well as for preservation for home demand. Barreled beef was put up in the West in considerable quantities as early as pork, and probably earlier, and transported by water to the Eastern markets; and beef packed at Boston, New York, New Haven, and other Eastern cities found its way all over the world on shipboard. The canning of beef was attempted in Chicago in the sixties, and enjoyed some little growth; but it was not until the year 1879 that the beef-canning business was taken up on a large scale by the packers. Mechanical ingenuity, in discovering a sure and practicable method of hermetically sealing tins, rendered possible the preservation of food in this way on a large scale; and the facilities already secured by the large packers for disposing of every part of the animal placed the business entirely in their hands. The convenience of canned beef, tongues, potted meats, and soups, and the fact that they could be guaranteed to keep sound in any climate for years, combined to steadily increase this branch of the industry. In 1890, 111,000,000 pounds of canned beef were exported. The dressed beef trade, which now forms so large a part of the packing business, had little importance prior to 1875, and received its great impulse from the use of the refrigerator car. The exportation of fresh beef had its beginning in a moderate way in the early months of 1876, 19,838,000 pounds being the total for the year. Ending with 1880, the average was 59,000,000 pounds, reaching 100,622,000 pounds in the last year of the period. For the next ten years the annual average was 113,000,000 pounds, reaching 182,500,000 in the last year of the period. For the past 10 years the average was 233,000,000 pounds, reaching 323,000,000 pounds in 1899. At first the cattle were transported on the hoof, and handled in the Eastern cities by the local abattoirs; but the long and tiresome journey was bad for the beef, and this method had to give place to something less wasteful and more humane. The packer now slaughters thousands of head of cattle daily, chills the carcasses at a uniform temperature, loads the beef into refrigerator cars, where a uniform temperature is maintained between Chicago and the Eastern markets, delivers the beef into his own cold-storage warehouses in the large Eastern centres, and distributes the carcasses to the local butchers, or if the meat is intended for export, runs his refrigerator-cars alongside the ocean-liners, and transfers the meat to the specially constructed chill-rooms of the steamers, and lands the beef in London, Liverpool, and Glasgow in prime condition and at a low price. There is good ground for the view that the cattle-raising industry of the West has been greatly benefited by this extension of slaughtering through the development of the dressed-beef trade. Definite figures illustrating the growth of the slaughtering of cattle for commercial dressed beef are unfortunately very meagre; but the general purpose of such information is served by the introduction of statistics indicating the number of cattle killed at prominent Western markets where this industry is prosecuted. The following compilation shows the average annual number of cattle killed from 1871 to 1900 at the places named, for various periods:

CATTLE KILLED IN FOUR WESTERN CITIES.

Period	Chicago	St. Louis	Kansas City	Omaha
1871–75.....	190,000	104,000	37,000	.....
1876–80.....	411,000	165,000	60,000	.....
1881–85.....	864,000	182,000	82,000	10,000
1886–90.....	1,696,000	210,000	341,000	170,000
1891–99.....	1,973,000	471,000	820,000	432,000

The killing of cattle for supplies of commercial product has also been prosecuted at various other points in the West, including Milwaukee, Sioux City, Indianapolis, Cincinnati, and Cleveland.

The following is a comparison of the number of cattle killed in 1871, 1880, 1890, and 1899, at the large Western markets mentioned, with the total receipts at Boston, New York, Philadelphia, and Baltimore for the same years, with totals for Western and Eastern markets mentioned:

CATTLE KILLED AND CATTLE RECEIVED.

	1871	1880	1890	1899
Chicago	141,000	496,000	2,224,000	1,702,000
St. Louis	69,000	196,000	227,000	542,000
Kansas City ...	20,000	50,000	549,000	993,000
Omaha	.....	.....	323,000	
centres.....				549,000
Four Western	230,000	742,000	3,323,000	3,786,000
Seaboard	745,000	1,268,000	1,280,000	1,425,000
West and East	975,000	2,010,000	4,603,000	5,211,000

The aggregate value of the 5,211,000 cattle in 1899 in the several markets where they were killed, including the number exported alive (409,176), was approximately $280,000,000.

Incident to traffic in dressed beef, the mutton trade has assumed important proportions in late years, this product being largely distributed in the refrigerator-car shipments of meats. The following figures show the number of sheep killed in the four Western centres and received at the seaboard cities in the years 1871, 1880, 1890, and 1899.

SHEEP KILLED IN FOUR WESTERN CENTRES AND RECEIVED AT SEABOARD CITIES.

	1871	1880	1890	1899
Sheep, West ..	261,000	405,000	1,621,000	5,019,000
Sheep, East ...	2,793,000	3,005,000	3,274,000	2,945,000

The published records of the Census Office do not give figures showing the capital invested in the packing business earlier than 1870. The official figures for 1870, 1880, 1890, and 1900 are as follows:

1870	$ 22,124,787
1880	49,419,213
1890	118,016,066
1900	190,706,927

Even after the packing business had assumed fairly large proportions, the packers were not aware of, or did not appreciate, the value of the offal, and the problem of how to get rid of it at the least expense was ever present. In Chicago the blood was allowed to run into the river, and men were paid five dollars a load to cart the heads, feet, tankage, and other waste material out upon the prairie and there bury it in pits and trenches. But gradually there grew up in the vicinity of the packing centres subsidiary enterprises having for their object the utilization of some or all of this waste material, and turning out glue, oil, tallow, and crude fertilizers. In time, however, the necessities of the business, and the growing competition, forced the progressive packer to include these industries in his own establishment. It became less profitable to pack in a small way, and to-day a large packing plant depends largely for its profit on the intelligent utilization of those so-called waste materials which in the early days of the packing business were not only thrown away, but the removal of which was an actual source of expense.

The sweet fat of the cattle forms the basis of butterine, made in their own butterine factories; the sheep pelts are scoured, and the wool removed in their own wool-houses, cleansed, and sold direct to the large Eastern cloth-mills. The intestines are cleansed and salted and used for sausage casings in their own sausage factories. In one or two packing houses there has been established a laboratory where the inner lining of the hog's stomach is made into pepsin of greater purity and activity than was possible when the sensitive material had to be transported in a raw state, and subjected to all the risks of decomposition and consequent loss of digestive power.

Pa'co, a name of the alpaca (q.v.).

Pactolus, păk-tō'lŭs, Asia Minor, the classic name for the modern SARABAT, a Lydian stream anciently celebrated for its golden sand, the reputed source of the wealth of Crœsus. It rises on the north side of Mount Tmolus, flows past Sardis, and has its outlet in the Hermus.

Pacuvius, pa-kū'vĭ-ŭs, **Marcus**, Roman tragic poet, nephew of the poet Ennius: b. Brundisium about 220 B.C.; d. Tarentum about 130 B.C. He was a student under Ennius, and not only a poet but a painter as well, as is shown by the many allusions to a picture of Hercules in Forum Boarium. Most of his tragedies followed Greek models; such were the 'Antiope' and the 'Dulorestes,' the latter being adapted from Euripides' 'Iphigenia in Tauris'; among native plays by him the one most often mentioned is the 'Paullus,' written in honor of Lucius Æmilius Paullus. He also wrote satires, but of this great body of work nothing but a few quotations by grammarians and rhetoricians has come down to us; these are edited by Ribbeck in 'Poetæ Latinæ Scænicæ' (1897). Consult: Müller, 'De Pacuvii Fabulis' (1890).

Padang, pä-däng', Sumatra, Dutch residency or province on the west coast of the island; also the province's capital city, on the right bank and mouth of the Aran River, which is very shallow at its embouchure and so makes a poor harbor. The city has government workshops and barracks, schools, hospitals, and churches; and was the earliest Dutch city in Sumatra (1666). It does business with the interior of the island by rail and exported in 1900; nutmegs 2,569 piculs (picul = 133⅓ lbs.); coffee, 13,537 piculs; cinnamon, 5,775 piculs; rattan, 31,058; copra, 53,889; tobacco, 10,514; gum, 9,836; and 20,076 hides. The city has a European and a Chinese quarter, in which there are a few stone houses; elsewhere bamboo is used. The climate is temperate and healthy; the temperature averages 25° C. for the year and rarely goes above 32° or below 20°. The city has several consulates, one American. Pop. about 12,000; the residency between 1,000,000 and 1,600,000.

Paddle, a wooden implement consisting of a wide, flat blade with a short handle, by means of which a small boat or raft is propelled, the operator spooning the water toward him. In canoes a double-headed paddle is used, being dipped alternately on either side. Among barbarous nations the paddle is still in use as a substitute for the oar.

Paddle-fish, Spoon-bill Cat, or **Spade-fish,** a singular fish (*Polyodon spathula*) of the sturgeon tribe, *Chondroganoidea* or *Chondrostei* (q.v.), which takes its name from the extraordinary spatulate prolongation of the nasal bones and upper jaws into a thin, spade-like, mud-digging instrument, measuring a third to a quarter of the total length of the fish. It abounds in the more sluggish parts of the rivers of the Mississippi Valley and of the Southern States, and occasionally reaches a length of more than six feet and 75 to 100 pounds in weight. In general form it resembles a sturgeon, but the skin is destitute of plates or scales, except on the upper lobe of the tail, and is a dull greenish mud-color in hue. The gill-apertures are of large size, and the gill-covers are prolonged backward nearly to the middle of the body. The mouth is large, and provided with teeth in the young, but they disappear as the fish grows older.

The paddle-fishes "feed chiefly on mud and minute organisms contained, stirring it up with the spatulate snout." Their spawning habits are little known, but apparently the eggs are voided as soon as the water where each fish lives reaches a fair degree of warmth; at this time they ascend the streams and bayous, swimming near the surface, and are caught by means of seines. At other seasons they may be caught on set-lines. Formerly the flesh, which resembles that of the sturgeon, was eaten only by the southern negroes, but now it finds a sale in many local markets, and is frequently smoked and sold for sturgeon. The greenish black roe is also coming into demand for the making of caviar. Another closely related form (*Psephurus gladius*) lives in Chinese rivers, and the two species constitute the family *Polyodontidæ*, fossil remains of which are found in Wyoming as far back as the Eocene. Consult: Jordan and Evermann, 'American Food and Game Fishes' (1902), and other authorities therein cited.

Paddock, păd'ŏk, **Algernon Sidney,** American lawyer and politician: b. Glens Falls, N. Y., 9 Nov. 1830; d. Beatrice, Neb., 17 Oct. 1897. He studied law, and removing to Nebraska in 1857 was admitted to the bar there, and became prominent in the political life of the Territory. In 1859 he was delegate to the Territorial Republican Convention, and in 1860 and 1864 to the National Republican Convention. In 1861 he was appointed secretary of the Territory, holding this position till 1867 when Nebraska was admitted to the Union, for a part of this time acting as governor. In 1868 he declined an appointment as governor of Wyoming Territory. In 1875 he was elected to the United States Senate and again in 1887, while between his two terms in the Senate he was for four years a member of the Utah Commission. While in the Senate he was a member of several important committees, including the committee on pensions, on public lands, on post-offices and on public buildings, and during his last term was chairman of the committee on agriculture and forestry.

Paddy-bird, the name among English-speaking persons in the East for various birds frequenting rice fields, especially small white egrets of several kinds; also a finch, the Java sparrow (q.v.).

Padel'la (Italian, from Latin *patella,* a small flat dish), a shallow vessel used in illuminations. A number of them are partially filled with oil or grease, in the middle of which is placed a wick, and are then placed so as to bring out when lighted the outlines of a building or the slope of a rising ground. The idea originated in Italy.

Pad'emelon, a small, naked-nosed kangaroo of the genus *Halmaturus,* specifically *H. thetidis,* or New South Wales. It inhabits brushy districts, and with others of its race in Australia and Tasmania is hunted for the sake of its hide.

Paderborn, pä'dĕr-bŏrn, Germany, a town and episcopal see in the Prussian province of Westphalia, at the sources of the Pader, 50 miles southeast of Münster. It is an old town, with narrow streets, and antique houses. It has a fine recently restored cathedral, with a tall and massive tower which, as well as the crypt, belongs to the 11th century — both in the Romanesque style; while the body of the church, 345 feet long, is of the 13th century. It has also a fine market place, an ancient town-house, and several other ancient churches and chapels. The industries include letterpress-printing, flour, soap, glass, beer, and tobacco. The ground on which it stands teems with mineral springs. The university which existed at this place from 1614 was suppressed in 1819. Pop. (1900) 23,502, mostly Roman Catholics.

Paderewski, pä-dĕ-rĕf'skē, **Ignace Jan,** Polish pianist: b. Podolia, Russian Poland, 6 Nov. 1860. He began serious study of the pianoforte in 1867, continued his preparation from 1872 at Warsaw under Kiel and Roguski, toured Russia, Siberia, and Rumania, and became a professor in 1878 in the Warsaw conservatory, in 1884 in that of Strasburg. After further study with Leschetizky in Vienna, he made his formal appearance as a concert pianist in 1887. He played in London in 1890, and in 1892 in the United States, which he has frequently revisited. He became the best-known pianist of his time, distinguished alike for his technique and his intellectual interpretation. In 1902 he conducted in the United States his opera 'Manru,' which achieved a great success. His interest in American music was shown by his placing in the care of trustees the sum of $10,000 for the encouragement of the composers of the United States. His compositions are largely for the pianoforte, and include 'Elégie, op. 4'; 'Danses Polonaises'; 'Chants du Voyageur'; 'Minuet'; 'Dans le Désert'; and 'Humoresques de Concert.'

Padiham, England, a town of Lancashire, on the Calder, a northeast suburb of Accrington. It is an industrial centre with cotton mills, coal mines, and stone quarries. Pop. (1901) 12,200.

Padilla, Juan Lopez de, hoo-ān' lō'pāth dā pä-thēl'yä, Spanish warrior: b. Toledo 1484; d. 24 April 1521. At the outbreak of the insurrection of the Castilian towns the Santa Junta entrusted him with the command of the forces of the communeros. After several successes his force was defeated by the royal army at Villalar 23 April 1521. He himself was wounded and taken prisoner, and executed on the following day. The two letters in which, shortly before his execution, he took leave of the town of Toledo and of his wife Maria Pacheco, were known in Spain as models of magnanimous feeling and touching simplicity. Both he and his widow, who defended Toledo for some time after his death, have become the subject of numerous dramas and poems.

Padilla, Bolivia, capital city of the province of Tomina and department of Chuquisaca, 90 miles northeast of Potosi. Originally called Laguna, the city now bears the name of Manuel Asencio Padilla, a patriot of this province, killed at Villar, 14 Sept. 1816. Pop. about 6,000.

Pa'dishah, in Persia, a title assumed by or applied to the Turkish sultan, derived from *pad, padi* (protector or throne), and *shah* (king, prince).

Padua, păd'ū-a, or **Padova,** pä'dō-vä, Italy, a university city, capital of the province of the same name, 22 miles west of Venice, on the Bacchiglione. It is surrounded by a lofty wall flanked with bastions, and is entered by seven gates. It is connected by canals with the Adige and the lagoons of the Adriatic. The streets and squares are usually lined with colonnades. The largest and finest of the piazzas is the Piazza Vittorio Emanuele, formerly called the Prato della Valle, which is planted with trees, surrounded by a running stream, and adorned with numerous statues of distinguished townsmen and other Italians. The principal buildings are the town-house or Palazzo della Ragione, an immense pile extending along the market place, erected between 1172 and 1219, and remodeled in 1420, standing upon open arches, and containing a large hall adorned with fine mural paintings, about 400 in number; the late Renaissance Duomo or cathedral, built in the 16th century, possessing a fine library, rich in rare books and manuscripts, and of which Petrarch, who was canon of the cathedral, is reckoned one of the founders; the baptistery of the cathedral, a fine Lombard building of the 12th century, its walls and cupola entirely covered with frescoes; and the Church of St. Anthony. The most famous establishment in Padua is the university, one of the most ancient in Europe, said to have been founded early in the 13th century by Emperor Frederick II., but according to other accounts not founded till 1260, and sanctioned by Pope Urban IV. in 1263. It was long renowned as the chief seat of law and medicine, and is celebrated for its long list of notable professors, including Galileo, Guglielmini, and Fallopius, and for its students, including Dante, Petrarch, and Tasso. In 1902 it had over 1,400 students. In connection with the university is a botanic garden, the oldest in Europe, containing some of the earliest specimens of trees and plants once rare, but now generally diffused; a library of 140,000 volumes, and an observatory. The manufactures include silk fabrics, ribbons, catgut, chemicals, machinery, automobiles, etc., and like the trade in cereals, oils, wines, and cattle, are increasing. Padua is the see of a bishop and the seat of several superior courts and public offices. It claims to have been founded shortly after the destruction of Troy by the Trojan Antenor. Under the Romans it became a flourishing municipal town, but on the decline of the empire was sacked, first by Alaric and then by Attila. Its great modern restorer was Charlemagne, under whose successors it successfully asserted its independence. In 1318 it fell under the domination of the Carrara family, and in 1405 under that of Venice, whose fortunes it has since followed. Among the distinguished men to whom Padua has given birth are the historian Livy, Sperone Speroni, a writer of tragedies in the 16th century; Mantegna; the poet Cesarotti. Pop. (1901) 93,560.

Paducah, pa-dū'ka, Ky., city, county-seat of McCracken County; at the confluence of the Tennessee and Ohio rivers, and on the Nashville, C. & St. L. and the Illinois C. R.R.'s; about 35 miles in direct line east by north of Cairo, Ill., and 80 miles southwest of Evansville, Ind. It has steamer connection with Mississippi, Ohio, and Tennessee river ports. It was settled in 1821 by James and William Pore, and was incorporated 11 Jan. 1830. During the Civil War the city was occupied by General Grant in September 1861. It is in a productive agricultural region; in the vicinity are forests of hard and soft wood, and deposits of fire-clay, glass, sand zinc, and fluor spar; limonite is found within 30 miles, and coal, in rich veins, within 60 miles. It has extensive manufacturing interests; the chief manufactures are pig iron, lumber, veneering, building material, spokes, rims, staves, headings, barrels, curtain poles, furniture, stoneware, pottery, saddles, collars, harnesses, tobacco products, knit goods, canned goods, brooms, brick, proprietary medicines, beer, and flour. It has a large ore milling plant and novelty works, in all 51 manufactories giving employment to about 3,000 persons, and the two railroads employ about 1,200. There is an extensive wholesale trade in clothing and food products, and in its own manufactures. The prominent public buildings are the United States government building, municipal buildings, churches, and schools. The educational institutions are Saint Mary's Academy, a high school, public and parish schools, and a number of private schools. There are 23 churches. The six banks have a combined capital of $1,350,000; the bank clearings are annually about $50,000,000. The government is administered under a charter of 1893, which provides for a mayor, who holds office four years, a board of aldermen, eight in number, chosen each four years, and 12 councilmen chosen each two years. The city owns and operate the electric light plant. Pop. (1890) 12,797; (1900) 19,446.

GEO. H. DAINS,
Secretary of The Commercial and Manufactures Association.

Pæ'an, a hymn sung in honor of Apollo. In the hymns to Apollo the phrase *Io pæan* was frequently repeated, and hence they were also called *pæans.* They were sung in time of sickness, and on other occasions, when it was desirable to propitiate the favor of the god. Hymns to other deities, or songs in praise of heroes,

were at a later period likewise called *pæans*. A pæan was sung, previous to battle, in honor of Mars and after a victory, in praise of Apollo.

Pædogen'esis, the reproduction of animals while in the immature or larval stage. Thus certain salamanders (*Amblystoma*) produce eggs which develop into adults when the parents still retain the gills and are aquatic in their habits. More strictly pædogenesis is applied to parthenogenesis (q.v.) in the larval stage. Best known instances are certain flies (*Miastor*), where the larvæ produce eggs which develop, without fertilization, inside the body and these finally escape by eating their way out, the parent being destroyed as a consequence.

Paër, pä-ār', **Fernando,** Italian composer: b. Parma, Italy, 1 June 1771; d. Paris, France, 3 May 1839. He was educated in Venice, summoned to the court of Vienna in 1795, and in 1801–7 was chapel-master at Dresden. After the battle of Jena he was attached to Napoleon's court, where he was imperial composer; in 1812–27 he directed the Italian grand opera at Paris and in 1831 was elected to the Academy. His work is rich in melody and his greatness as an Italian composer is unquestioned, yet of his voluminous work little is remembered. His best known operas are 'Griselda' (1796); 'Camilla' (1801); 'Agnese' (1819).

Pæstum, pēs'tŭm, ancient Greek city of Southern Italy on the west coast of Lucania and the present Gulf of Salerno (in ancient times *Sinus Pæstanus*). Founded as early as the beginning of the 6th century B.C. as a colony of Sybaris under the name of Posidonia (that is, "sacred to Poseidon," or Neptune), and reaching great prosperity in the next century and a half, the city was conquered by the Samnites of Lucania, who probably Italianized its name into Pæstum. It did not regain its old position even when two centuries later (273) it became a Roman colony, but is famed in Roman poetry for its roses. It was devastated in the 9th century by the victorious Saracens, and in the 11th by Robert Guiscard. The poor village of Pesto, a railway station, now occupies the site, which has, however, two remarkable Doric temples, one to Poseidon, the tutelar god, and one to Demeter. Consult: Labrouste, 'Les Temples de Pæstum' (1877).

Pætus, pē'tŭs. See ARRIA.

Paez, Jose Antonio, hō-sā' än-tō'nē-ō pä'äth, Venezuelan patriot and soldier: b. Araure 13 June 1790; d. New York 7 May 1873. He was of native stock and with a body of llaneros, trained like himself as herdsmen, about 1810 joined the patriot army, in which he became division commander in 1819. He administered a severe defeat to the Spaniards in 1821 and in 1823 captured their last port, Puerto Caballo. Jealous of his successor in 1826 he attempted rebellion but was conciliated by Bolivar, who made him military and civil chief of Venezuela, thus paving the way for the war of Venezuelan independence in which Paez was the prime mover. In 1831–5 he was president of the new republic, and held the same office 1839–43 after acting as commander-in-chief during Vargas' administration and putting down two serious rebellions. In 1846 he was appointed dictator during the race war; in 1848 refused the presidency; in 1848 headed a rebellion against Monagas, but was defeated and imprisoned for several months; spent eight years in banishment; returned to Venezuela in 1858; was minister to the United States in 1860; became commander of the army in 1861; and was again driven into exile in 1863 by a revolution against his lieutenants, to whom he had entrusted large powers. The Federalist party was successful and Paez, leader of the Centralists, passed the remainder of his life in New York. Consult his 'Autobiografia' (1867).

Pagan, pā-gān', India, a town of Upper Burma, on the east bank of the Irawady, 90 miles southwest of Mandalay. Pagan was founded in 847 A.D., and was the capital of Burma until 1284, when it was abandoned during a Chinese invasion. The remains of Buddhist temples and pagodas cover an extensive area, and are of great archæological interest. Some of them are still occupied by priests, and the town has a population of about 8,000, chiefly Buddhists.

Paganini, pä-gä-nē'nē, **Niccolo,** Italian violinist: b. Genoa 27 Oct. 1782; d. Nice 27 May 1840. His father discerning the talents of his son, put him at an early age under the best masters to learn the violin. With this instrument he was able to perform in public at the age of nine. In his 12th year he went to Parma, where he was taught counterpoint by Rolla (see ROLLA, ALESSANDRO) and Ghiretti. In 1797 he performed in the cities of Lombardy and afterward in the principal cities of all of Italy. He settled at Lucca, in 1805, where he was appointed principal violinist to the court chapel. In 1808 he left Lucca, and for five years lived an obscure and rambling life in Italy. In 1813 he reappeared before the world, and performed at Milan. He remained in Italy till 1828, suddenly appearing, and, after exciting unbounded enthusiasm by his public performances, as suddenly departing. In the year mentioned he visited Austria and Germany, appearing first in Vienna. The wonder which he excited was caused not merely by his extraordinary skill, but also by his personal appearance, which had something weird and even demoniacal in it. His imitation of the flageolet, and his rendering of whole pieces on the G string, were particularly applauded. The emperor of Austria appointed him his chamber virtuoso, and the king of Prussia his director of music. After visiting the great towns of Germany he proceeded to France and Great Britain. In Paris he produced an unprecedented sensation, and, as in Germany, made immense gains. He was equally successful on the other side of the Channel. He returned in 1834 to Parma, where he purchased the villa Gajona. Among his compositions, one of the most celebrated is the 'Carnival of Venice.'

Pagans (Lat. *pagani,* those who live in the villages, *pagus*), those who remained unconverted to Christianity and the worship of the true God. While the cities were the centres of Christian life the remote villages (*pagi*) were still in pagan darkness, and their inhabitants kept up the practice of idolatry and the creed of polytheism. The men of the village, pagans, among the Latin races corresponded to the men of the heath, heathens, among the Teutonic races. The term pagan is not properly applied to Jews or Mohammedans since these worship

the one God, the Jehovah, of Christians and Jews.

Page, John, American legislator: b. Rosewell, Va., 17 April 1744; d. Richmond, Va., 11 Oct. 1808. He was graduated from William and Mary College in 1763, where he was intimate with Thomas Jefferson. He served under Washington in an expedition against the French and Indians, and during the American Revolution acted as a member of the committee of public safety and as lieutenant-governor of the commonwealth, sacrificing to the cause of the colonies a large share of his private fortune. He served in Congress in 1789–97, and in 1802 was elected governor of Virginia. In 1805 he was appointed by President Jefferson commissioner of loans for Virginia, which position he held until his death.

Page, John Lloyd Warden, English author: b. Minehead, Somerset, 25 Aug. 1858. After a dozen years' practice as a solicitor he retired in order to devote himself to topographical literature. Among his published works are: 'Dartmoor and its Antiquities' (1889); 'Exmoor' (1890); 'The Rivers of Devon' (1893); 'The Coasts of Devon and Lundy Island' (1895); 'The Church Towers of Somerset,' with E. Piper (1890–1900); etc.

Page, Thomas Jefferson, American naval officer: b. Shelly, Gloucester County, Va., 4 Jan. 1808; d. Rome, Italy, 26 Oct. 1809. In 1853–6 he was lieutenant-commander in explorations of the La Plata region in South America, and in February 1855 his vessel was fired upon from a Paraguayan fort. Resigning in 1861 he then entered the Confederate service, was commissioned commodore and in 1862 was sent to England to take charge of a cruiser. As, however, he was prevented from taking the ship out he secured the command of a small iron-clad at Copenhagen, which was soon after seized from him while in a Spanish port. Leaving the service he subsequently resided in Argentina and in Florence, Italy. He wrote 'La Plata, the Argentine Confederation, and Paraguay' (1859).

Page, Thomas Nelson, American lawyer and author: b. Hanover County, Va., 23 April 1853. He was educated at Washington and Lee University, studied law for a year at the University of Virginia, was admitted to the bar, and established himself in practice at Richmond. His avocations became literature and lecturing. Perhaps no post-bellum writer has depicted with so rare a skill the negro and white life of slavery, war-time, and reconstruction. His rendering of the Virginia colored dialect in such stories as 'Marse Chan,' first printed in the 'Century' 1884; later in the collection 'In Old Virgina' (1887), assumed a real philological importance. Among his further writings are: 'Befo' de War,' poems by A. C. Gordon (1888); 'On Newfoundland River' (1891); 'Elsket' (1891); 'The Old South,' essays (1892); 'Red Rock' (1898); 'Gordon Keith' (1903).

Page, Walter Hines, American publisher: b. Cary, N. C., 15 Aug. 1855. He was educated at Randolph-Mason College, Va., and Johns Hopkins University, was editor of 'The Forum' 1890–5, literary advisor to Houghton, Mifflin & Co., publishers, 1895–9; and editor of 'The Atlantic Monthly' 1896–9. Since November 1900 he has been editor of 'The World's Work' and a member of the New York publishing house of Doubleday, Page & Co.

Page, William, American artist: b. Albany, N. Y., 23 Jan. 1811; d. Tottenville, Staten Island, 1 Oct. 1885. He studied under James Herring and Samuel F. B. Morse, at the Academy of Design, and lived 11 years in Italy, copying the Italian masters and especially Titian. He spent much time in analyzing the methods of that master and was so successful in imitating his style and coloring that one of his pictures was seized by the Florentine authorities, as an original Titian which was being conveyed out of the country. In 1836 he was elected a member of the National Academy, of which he was president, 1871–3. Among the portraits painted by him are those of John Quincy Adams, the Brownings, Charlotte Cushman, and others, including a full-length likeness of Admiral Farragut, which was purchased and presented to the emperor of Russia. His chief paintings are: 'The Holy Family' (1837); 'The Last Interview' (1838); 'Ruth and Naomi' (1880).

Paget, păj'ĕt, Sir **George Edward,** English physician: b. Great Yarmouth, Norfolk, England, 22 Dec. 1809; d. Cambridge, England, 16 Jan. 1892. He was graduated from Caius College, Cambridge, in 1831, and later studied medicine in Cambridge and in Paris. In 1872 he was appointed regius professor of physic at Cambridge, and became K. C. B. in 1885. He held high rank in his profession, and did much to advance the education of physicians.

Paget, Sir **James,** English surgeon, younger brother of Sir George Edward Paget (q.v.): b. Great Yarmouth, Norfolk, England, 11 Jan. 1814; d. London 30 Dec. 1899. He studied in St. Bartholomew's Hospital, London, became a member of the Royal College of Surgeons in 1836, and a fellow in 1843. He was consulting surgeon at St. Bartholomew's Hospital, and sergeant-surgeon to the queen, and was created a baronet in 1871. He was vice-chancellor of the University of London, president of the Royal College of Surgeons, and delivered many important lectures on his surgical work. He published: 'Lectures on Surgical Pathology' (1853); 'Clinical Lectures' (1875); etc.

Paget, Violet ("Vernon Lee"), English essayist and critic: b. 1856. Since 1871 she has made her home in Italy, devoting herself in the main to the study of Italian art and literature. She is a brilliant though not always a convincing writer, fluent, and discursive, and not infrequently subtle as well, and possesses the power of holding the reader's interest, no matter what subject be chosen. Among her works, all of which have appeared over the signature of "Vernon Lee," are: 'Studies of the 18th Century in Italy' (1880); 'Belcaro: Essays on Sundry Æsthetical Questions' (1882); 'Ottilie: an 18th Century Idyll' (1883); 'Euphorion,' essays (1884); 'Miss Brown,' a novel (1884); 'Juvenilia,' essays (1887); 'Renaissance Fancies and Studies' (1895); 'Limbo,' essays (1897); 'Genius Loci' (1899); 'Hortus Vitæ: Essays on the Gardening of Life' (1903).

Pago, pā'gō, island of the Adriatic in the bay of Quarnero and district of Zara, Dalmatia;

an Austrian possession. The canal of Morlacca separates the island from the mainland. Area, 81 square miles; pop. (1890) 6,203. The capital city, bearing the same name, lies in the deep Vallone di Pago, which is hemmed in on every side save where the Bocca di Pago gives approach; the city has important saltworks, and (1890) a population of 3,554.

Pago-Pago. See PANGO-PANGO.

Pago'da, a name commonly given to the temples of the Hindus and other nations in Asia. They are built of wood and stone and adorned with obelisks, columns, and other architectural ornaments. Some are of great size and height. The most celebrated pagodas are those of Benares, Siam, Pegu, the Juggernaut, etc.

Pagsán, päg-sän', a mountain of the Philippines, a peak of the Cordillera del Norte, on the intersection of the boundaries of Abra, Cagayen, and Ilocos Norte provinces; height, 7,330 feet. At Pagsán a spur leaves the main range, which forms the boundary between Abra and Ilocos Norte. The south slopes of Pagsán are drained by the Anayan and the Calúan, which unite to form the Tinog River, a tributary of the Abra.

Pagu'rus, or **Paguridæ.** See HERMIT CRAB.

Pahang, pä-häng', Indo-China, one of the federated Malay states under British protection, on the east coast of the Malay Peninsula, between 2° 28′ and 3° 45′ N. and 101° 30′ and 103° 30′ E., to the north of Negri Sembilan and Johor, east of Perak and Selangor, south of Kelentan and Trengganu, and west of the bordering China Sea. The state is 210 miles long, 130 wide, with 112 miles of coast and an area of 15,000 square miles. It takes its name from the Pahang River, which drains the region and is navigable for large river boats 200 miles from its source, but too shallow for commerce of importance. Pahang in ancient times was called Indrapura. It was ruled by the Siamese until the 16th century; then by refugees from Malacca, who founded a royal line, between the members of which there was bitter war in 1855–65. In 1887 a treaty was signed with the British governor of the Straits Settlements; in the following year a British resident was appointed to protect British interests, but disorder broke out again and was only quelled by the armed interference of the Straits governor; in 1895 Pahang joined the Malay Federation. The state is fertile with regular and sufficient rains, and is cooler than the western coast of the peninsula. The important industry of Pahang is gold mining; the Raub mine and other lodes along the river are successfully worked by European capital; electricity is carried to the mines seven miles by overhead wires. The state's imports in 1900 were valued at $973,405; the exports were $2,322,950, including $680,000 worth of gold and a little more than 1,000 tons of tin. The population (1901) was 84,113; 134 being Europeans and Americans; 73,462 Malays and aborigines of other stocks; 8,695 Chinese; and 1,227 Hindus, especially Tamils. The capital is Kuala Lipis; there are four administrative districts.

Paharia, or **Maler,** a northern section of the Dravidian race, inhabiting the Rajmahal Hills, Bengal, India. See DRAVIDIANS.

Pahlanpur, or **Pahlumpur.** See PALANPUR.

Pahlavi (pä'la-vē) **Language.** See PERSIA, LANGUAGE AND LITERATURE.

Pahlen, pä'lĕn, **Peter Ludwig,** COUNT OF, Russian statesman: b. Palms, Esthonia, 28 April 1745. He fought in the war with Prussia 1761–2, against Turkey 1769, and against Sweden; was ambassador to Sweden 1790; was governor-general of Courland 1795, and later of Finland; was made a Russian count in 1799 and prime minister, foreign minister, and military governor of Saint Petersburg in 1800. These high offices he used to further the conspiracy against the Czar Paul I., which resulted in the assassination of that monarch in 1801. Alexander I. distrusted Pahlen and retired him. His son, PETER (1778–1864), a great Russian general, fought in Asia in 1796, against the French 1812–14; and in Poland in 1831. He was Russian minister to Paris from 1835 to 1841. His younger brother, FREDERICK (1780–1863), was minister to Prussia, to Rio Janeiro, and to Munich, a signatory of the treaty of Adrianople in 1829, and later governor of Kherson.

Pailleron, Edouard Jules Henri, ā-doo-ār zhül ŏñ-rē pä-yė-rôñ, French dramatist: b. Paris, France, 17 Sept. 1834; d. there 20 April 1899. He was a clerk in a notary's office until 1860, when his first work, a volume of satirical poems and a play, was published, after which he devoted himself to literature. His plays are written in both prose and verse, and have attained popularity, the later ones receiving greatest attention though really inferior to his first work. He was elected to the Académie Française in 1884 as a result of the popularity of his 'Le Monde ou l'on s'ennuie' (1883). Among his plays are: 'Le Mur mitoyen' (1861); 'L'Age Ingrat' (1879); 'La Souris' (1887); etc.

Pain, Barry, English author and journalist. He was educated at Cambridge, was for a time an army tutor, and in 1890 removed to London. He has published: 'In a Canadian Canoe' (1891); 'Playthings and Parodies' (1892); 'Stories and Interludes' (1892); 'Graeme and Cyril' (1893); 'Kindness of the Celestial' (1894); 'The Octave of Claudius' (1897); 'Wildmay and Other Stories of Women' (1898); 'Romantic History of Robin Hood' (1898); 'Eliza' (1900); 'Another English Woman's Love Letters' (1901); 'The One Before' (1902).

Pain, a sensation felt in animal bodies, always disagreeable and varying in degree from a slight uneasiness to intense agony. It is a very important sign in some diseases, and is nearly always associated with an inflammation, an ulceration, or a solution of continuity in some of the tissues of the body. But in health also intense sensory stimuli, that is, beyond the individual's natural limit of stimulation, are capable of producing pain. Griesinger states that the essence of pain lies in a disturbance of the organization of the nerve at some point in its course. Tickling, if persistent, may become painful; spasmodic contractions of muscles cause severe pain; so also does intense sunlight shining into one's eyes, and high-pitched sounds, if long continued, produce painful sensations. Those parts of the body which are most sub-

ject to injury are supplied with nerves in the largest quantity.

Were it not for sensibility to pain, important parts of the body might be irreparably injured without the knowledge of the individual. This sensibility undoubtedly differs in degree in both men and animals. Persons of a highly excitable temperament usually feel pain intensely, especially if they are predisposed to neuralgia. Pain is called acute, when sharp and violent; lancinating, when of a stabbing or darting character; lacerating, when there is the sensation of tearing; burning, when it resembles the pain of a burn. Pains are also distinguished as smarting, stinging, griping, bearing-down, gnawing, biting, etc. The degree of pain is not always in proportion to the gravity of a disease, and may be masked by other symptoms in a severe affection. Extensive ulcerations may occur in the stomach and intestines, for example, attended with very little pain. Cartilage is believed never to be the seat of pain. Pain is frequently sympathetic or reflex, occurring in a portion of the body remote from the seat of disease or irritation; for example, in disease of the hip-joint pain is felt in the knee. The feeling of pain is always referred to the periphery of the sensory fibres, no matter what portion of the sensory tract has been irritated. "Lesions of the brain are rarely accompanied by sensation in that organ, but often by severe pain referred to the extremities."

While pain is but a symptom, it should, if possible, be relieved, though the cause may not be removed. Painful sensations are associated with a depression of the circulation. Pain exhausts nervous energy, interferes with sleep, interrupts the appetite and digestion, and if long continued may shorten life. For treatment, remove the cause, enjoin rest, apply locally hot water or poultices, sinapisms, counter-irritation, and anodyne liniments. Anodyne or narcotic drugs, although of value, should be used cautiously. Regulation of the diet and attention to the condition of the bowels is of very great importance.

Paine, Albert Bigelow, American author: b. New Bedford, Mass., 10 July 1861. He was educated in the public schools of Xenia, Ill.; was editor of the juvenile department of the New York *Herald,* and since 1899 has been editor of the League department on 'St. Nicholas Magazine.' He has published: 'The Mystery of Eveline Delorme' (1894); 'The Hollow Tree' (1898); 'The Deep Woods' (1899); 'The Great White Way' (1901); 'The Van Dwellers' (1901).

Paine, Charles Jackson, American sportsman: b. Boston, Mass., 26 Aug. 1833. He was graduated at Harvard College in 1853 and entered the army as captain of the 22d Massachusetts infantry 8 Oct. 1861. He served with distinction during the Civil War; was appointed brigadier-general of volunteers in 1864; and in 1866 was brevetted major-general. He acquired a large fortune in railway enterprises, and became prominent as a yachtsman. The Puritan, Mayflower, and Volunteer, owned by him, were successful defenders of the America's cup.

Paine, Halbert Eleazar, American lawyer and soldier: b. Chardon, Ohio, 4 Feb. 1826. He was graduated from Western Reserve University, Ohio, in 1845, and practised law in Cleveland until 1857, when he removed to Milwaukee, Wis. He enlisted in the Union army at the outbreak of the Civil War, and was commissioned colonel, from which rank he rose to be brigadier-general. At Fort Hudson in 1863, where he commanded the third division, he lost a leg, and in 1864 he was discharged with the rank of brevet major-general. He was a member of Congress 1865–71, after which he practised law in Milwaukee, and in 1888 was appointed commissioner of patents. He published: 'Paine on Elections' (1888).

Paine, John Knowles, American organist and composer: b. Portland, Maine, 9 Jan. 1839. In 1858–61 he studied in Germany, in 1862–73 was instructor in music at Harvard, and in 1875 became professor of music there. He composed the music for the 'Œdipus Tyrannus' of Sophocles, as performed in the original at Cambridge in 1881; the 'Centennial Hymn' to Whittier's words for the Exhibition at Philadelphia in 1876, and the Columbus march and hymn for the World's Columbian Exposition of 1893. Among his further works are: the opera 'Azara'; 'Spring Symphony'; the cantatas, 'The Nativity' and 'The Song of Promise'; choruses to Aristophanes' 'Birds'; symphonic poems; music to the 'Tempest'; and an overture to 'As You Like It.'

Paine, Levi Leonard, American theologian: b. Holbrook, Mass., 10 Oct. 1832; d. Bangor, Maine, 10 May 1902. He was graduated from Yale in 1856 and from Yale Divinity School in 1861. He then entered the Congregational ministry and was pastor at Farmington, Maine, 1861–69. In 1870 he became professor of ecclesiastical history in Bangor Theological Seminary and held that post until his death. He was the author of an important work entitled 'A Critical History of the Evolution of Trinitarianism and Its Outcome in the New Christology' (1900).

Paine, Robert Treat, signer of the Declaration of Independence: b. Boston 11 March 1731; d. there 11 May 1814. He was graduated at Harvard at 18, studied theology, was chaplain to the New England troops in 1755, and in 1759 was admitted to the bar and began to practise law in Boston. He represented Taunton in 1768 at the convention called to discuss Sir Francis Bernard's dissolution of the general court; conducted the prosecution of Preston and his men for the Boston Massacre 1770, and the impeachment of Peter Oliver for receiving money from the king and not from the colony; served in the general assembly of the State 1773–4, in the Provincial Congress 1774–5, and in the Continental Congress 1774–8, being a signer of the Declaration and a member of various important committees. He was a delegate to the State convention of 1779, which adopted a constitution; was attorney-general of Massachusetts 1780–90; and sat as judge of the supreme court 1790–1804.

Paine, Robert Treat, American poet, son of the preceding: b. Taunton 9 Dec. 1773; d. Boston 13 Nov. 1811. His baptismal name, Thomas, was changed in 1801 by act of Legislature, that he might bear his father's name and not that of the famous deist. He was graduated at Harvard in 1792, was then in business for a time, but devoted most of his attention

to journalism and poetry. His journal, the 'Federal Orrery,' was given up after two years. His marriage with an actress in 1795 shut him out of Boston society and alienated his father. The son practised law with some success and much brilliancy, but he soon fell into wayward courses and died in poverty. His best known poems, which were popular, but practically without value, were: 'The Invention of Letters,' delivered at Cambridge in 1795; 'The Ruling Passion' (1797); the patriotic song, 'Adams and Liberty' (1798); and the bitter political poems, 'The Jacobiniad' and 'The Lyars.'

Paine, Robert Treat, American philanthropist, great grandson of R. T. Paine (q.v.), signer of the Declaration of Independence: b. Boston 28 Oct. 1835. He was graduated from Harvard in 1858, was admitted to the bar the next year and practised his profession till 1870, when he retired. In 1879 he organized in Boston the Wells Memorial Workingmen's Institute, of which he is president, and he is also president of the Workingmen's Building Association, the Workingmen's Loan Association, and of the Associated Charities of Boston, and in 1890 created and endowed with $200,000 a charitable trust called "The Robert Treat Paine Association."

Paine, Thomas, American political and religious agitator: b. Thetford, Norfolk, England, 29 Jan. 1737; d. New York 8 June 1809. He was a staymaker at Sandwich, Kent, a Methodist preacher in London, a tobacconist at Lewes, Sussex, and an exciseman, before his arrival in America in December 1774. Hostilities having commenced between the mother country and the colonies, he composed his celebrated pamphlet, 'Common Sense' (1776), which was written with great vigor. The object of this tract was to recommend the separation of the colonies from Great Britain. In 1777 he received the office of secretary to the committee of foreign affairs. While in this office he began to publish a series of political appeals called 'The Crisis,' the first number of which contained the words, "These are the times that try men's souls." He was obliged to resign his secretaryship in January 1779, being charged with divulging some official secrets in a controversy with Silas Deane, whom he accused of a fraudulent attempt to profit by his agency by conveying the secret supplies of stores from France. But in the following November Pennsylvania testified her approbation of his conduct on this occasion by appointing him clerk to the Assembly. With his salary of £500 as clerk, Paine started the subscription which resulted in the establishment of the Pennsylvania Bank (later the Bank of North America). In 1785 he received $3,000 from Congress in recognition of his services during the war. He also received 300 acres of land in New Rochelle from the State of New York. In 1787 he embarked for Europe. On the appearance of Burke's 'Reflections on the French Revolution,' he wrote the first part of his 'Rights of Man' (1791) in answer to that celebrated work. The second part was published 1792, and on 21 May in that year a proclamation was issued against wicked and seditious publications, alluding to but not naming the 'Rights of Man.' On the same day the attorney-general commenced a prosecution against Paine as the author of that work. While the trial was pending he was chosen member of the National Convention for the department of Calais, and, making his escape, went to France. On the trial of Louis XVI. he voted against the sentence of death, proposing his imprisonment during the war and his banishment to the United States afterward. This conduct offended the Jacobins, and toward the close of 1793 he was excluded from the Convention on the ground of his being a foreigner (though he had been naturalized), and immediately after he was arrested and committed to the Luxembourg. Just before his confinement he had finished the first part of his work entitled the 'Age of Reason, being an Investigation of True and Fabulous Theology.' This he confided to the care of his friend, Joel Barlow (q.v.), and it was published in London and Paris in 1794. By this step he forfeited the countenance of the greater part of his American connections. On the fall of Robespierre he was released, and in 1795 published at Paris the second part of his 'Age of Reason.' In May 1796, addressed to the Council of Five Hundred a work entitled 'The Decline and Fall of the System of Finance in England,' and also published his pamphlet, 'Agrarian Justice.' A third part of the 'Age of Reason' was published in 1807. Fearful of being captured by British cruisers, he remained in France till August 1802, when he embarked for America, and reached Baltimore the following October. He was buried on his own farm, but his remains were taken to England by William Cobbett in 1819. The strong part taken by this extraordinary man in religion and politics has produced such extremes of praise and execration that there exist few or no sources of unbiased information either as to his abilities or character except his writings. That he possessed much native vigor of intellect is indisputable, and he was master of a spirited argumentative English style. But much of his work, particularly the 'Age of Reason,' was unscholarly, and his attacks on religious beliefs were ill advised. He was not, however, an atheist, as has been popularly believed. His services to the American cause were lasting and important. The political pamphlets, letters, and addresses of Paine are numerous, and may be found in the collective editions of his works. Conway published an excellent edition of Paine's work in 1893–6. The 'Life of Paine' by the same author, published in 1892, is the standard one. Consult his works edited by M. D. Conway in four volumes (1894–6) and Conway's life of Paine (1892); also Tyler, 'Literary History of the American Revolution' (1896).

Paine, William H., American engineer: b. Chester, N. H., 27 May 1828; d. Cleveland, Ohio, 31 Dec. 1890. He studied civil engineering, engaged in surveying in Wisconsin, and in 1849 surveyed a wagon road over the Rocky Mountains. He was appointed captain of engineers on the staff of Gen. McDowell in 1862, and was later with the Army of the Potomac, where his services were of much value. He assisted in the construction of the Brooklyn Bridge, for a time exercised entire supervision of the work, and from the date of its completion until 1889 was consulting engineer. The

construction of cable railways in various cities occupied him during his later years.

Painesville, pānz'vĭl, Ohio, city, county-seat of Lake County; on the Grand River, and on the Lake Shore & M. S., the Pittsburg & W., and the New York, C. & St. L. R.R.'s; about 25 miles east by north of Cleveland and three miles from Fairport, on Lake Erie. It is in an agricultural region, in which there are extensive deposits of fire-clay. Its chief manufacturing establishments are flour mills, machine shops, brick machine works, veneer machine works, and foundries. It has considerable commerce on account of the fine harbor and large ore docks at Fairport. Lake Erie College, opened in 1859, the public schools, a public library, which contains nearly 6,000 volumes, are the educational institutions. The city owns and operates the electric-light plant and the waterworks. Pop. (1890) 4,755; (1900) 5,024.

Paint consists of colors or dyes so mixed with oil, glue or water, as to spread easily over a surface, and retain its brilliancy after drying. It is usual to add a dryer, and a solvent or thinner to paints before using them. The vehicles employed in painting are various, but the principal oil used in oil-painting is that which is obtained from flaxseed. This linseed oil is purified by settling for about four months in tanks with a temperature of 70° F. No oil but this more freely absorbs the oxygen of the air, by which it hardens into what is termed linoxyn. Tong oil or Chinese wood oil, which absorbs oxygen to about the same degree is unfitted in other respects for use in writing pigments. Dryers are employed to harden the painted surface before it can become dimmed by absorbing the dust with which the atmosphere is charged. They take in oxygen from the air with great rapidity, while the air takes up the damp oil. To make a successful dryer, lead and manganese compounds are dissolved in oil, which thus becomes oxygenated. They absorb oxygen from the air, and transfer it to the oil, which thus becomes solidified. The opposite agents to these dryers are the solvents, the best of which is turpentine. The advantage of using turpentine is that, as it is slow to evaporate, it keeps the paint long enough moist to allow of the brush marks sinking and flattening out into a smooth surface. Benzine, which is sometimes employed as a solvent, evaporates too rapidly, and leaves the surface uneven. Paints can be rendered to a high degree fire-proof by mixing with them boric acid or a soft and readily fusible glass. The heat melts the boric acid or the glass which forms an air-proof sheath to the wood or other substance so painted, and thus protects them pretty efficiently from the flames. Paints vary in the length of time for which they preserve their lustre, and it is absolutely necessary for the artist to select those which are known to be most permanent. The most permanent of blues is ultramarine, while Prussian blue and indigo are apt to fade. Cobalt, however, is the most lasting of all blues. Among the reds the only really unchanging colors are vermilion and the ochres; madders, carmines, and crimson lakes are likely to fade, the last two very rapidly. Oxide of chromium and terre verte are the only permanent greens; Naples yellow, raw sienna, cadmium, and yellow ochre the only stable yellows. Madder brown and Vandyke brown will fade, but raw and burnt umber and burnt sienna retain their tint forever. All the known blacks and whites are durable excepting when the latter are adulterated with chalk or other impurity. See Coal Tar Colors; Coloring Matters; Dyes; Luminous Paint; Mineral Colors.

Paint, Oil, and Varnish Industry, in the United States, had its genesis in a mill for the manufacture of linseed oil established in New York city in 1715. Three years later John Prout, Jr., erected a similar factory in Connecticut. In 1786, four oil-mills were in operation in Lancaster County, Pa. The rapid growth of the linseed-oil industry had not been without its effect in stimulating the use of paints. By 1795 the use of paint had become common. In the towns even the ordinary householder used paint about his dwelling. If he was too poor to indulge in the luxury of an outside coat, the interior woodwork, at least, was painted, and the churches and public buildings all showed the work of the painter. The white house with green blinds was then and for many years afterward the single type of ultra-æsthetic decoration. The introduction of more tasteful colors and shades and more harmonious tints began early in the 19th century, but their general adoption as seen in present effects is still a comparatively recent matter.

The first successful attempt to manufacture white lead in this country was made in Philadelphia by Samuel Wetherill in 1804. Red and white lead were made by him of as good quality as that imported, and other manufacturers of these products soon followed him. In 1806 color making was begun experimentally by Anthony Tiemann, who regularly started in the manufacture in 1807. His first products were rose pink, Dutch pink, French green, and blue. The manufacture of Prussian blues was begun in 1809, and in 1820 chrome yellow was added to the products of this firm. This latter color was first made in this country by William Guest, of Baltimore.

Meanwhile by 1811 there were 22 different colors of paint being made in Philadelphia, while three small red-lead factories in Pittsburg, the first west of the Alleghanies, were turning out annually a product valued at $13,000. Chrome paints of the first quality commanded in the early days $3 a pound, and their manufacture was a profitable one. Extensive deposits of chromic iron discovered in Chester County, Pa., gave an added impetus to paint grinding, and its growth was strong and steady. The succeeding decade saw the industry firmly established in New York. By 1820 there were extensive works in Brooklyn and New York producing red and white leads, chrome and other colors, while a factory in Rensselaer County, N. Y., was turning out annually $4,500 worth of Prussian blue. This establishment used the shavings of leather in obtaining its color, after the process described by Dr. John Pennington in 1790. Factories in Albany, Boston, and other cities, as well as the extensive establishments in Philadelphia, showed how firmly the paint industry had established itself at this time, and the next 20 years brought the natural and resultant development not only of this but of the related manufactures of varnishes and oils.

Prior to 1828 all the varnish consumed in this country was imported. Its use, while less common than that of paint, was nevertheless sufficiently general to recommend it to manufacturers as a profitable product, and accordingly the first establishment for making it was founded by P. B. Smith, New York city, in 1828. In 1830 the second factory was established by Tilden & Hurlburt, and was the first permanent concern in the business.

The first importations of gum copal, direct from Zanzibar and the west coast of Africa, were largely used by Tilden and Hurlburt, and this firm was the first to export American varnish, they consigning a quantity to South America and Mexico in 1836. The quality of the American goods proved so exceptional that they not only competed with, but to a great measure supplanted, the exportations of the European manufacturers. The stimulation of a heavy foreign demand joined to increased domestic consumption so augmented the business that the matter of obtaining supplies of the gums used became of great importance. In 1851 such quantities of these raw materials were being used that the manufacturers began the establishment of the system of direct trade relations with the west of Africa.

The growing importance of both the paint and varnish production of the country had meanwhile early affected the oil-mills. Until 1836 these mills used only home-grown seed, and a capacity of fifty bushels a day was a very fair average output. Under the increasing use of linseed-oil new methods were found necessary, and the firm of J. & L. K. Bridge, of Brooklyn, in that year imported the first cargo of flaxseed from Sicily. Odessa, Alexandria, and, in 1846, Calcutta were successively opened as supply points of this rapidly increasing trade.

In 1850 the paint industry in this country entered upon a new era. The zinc deposits of New Jersey, opened in that year, gave an adequate and cheaply worked supply of ore from which the oxide could easily be reduced. This zinc oxide, in the form of a white powder, had been recognized since the last decade of the preceding century as a valuable substitute for white lead as a body for paints. It had up to this time, however, received little attention, owing to the restricted amount available for the market. The new and abundant supply turned the manufacturers to experiments in this direction, and its use since has been general. Several mines were immediately opened, and the ore reduced and turned in a furnace, where resultant white and powdery zinc oxide floated upward, was caught in bags, pressed, and sold to the paint manufacturers. Mineral paints, too, made from different earths, came into prominence at about this time, much being claimed for their fire-proof and indestructible qualities.

Of the chemical and technical discoveries and appliances by which new colors, finer and more delicate shades, the bright and vitrifiable pigments of the decorative potter and art-tile manufacturer, and the paints of the artist, either in oil or water-color, have been produced it would be tedious to the general reader to speak. The art of mixing colors to produce the almost innumerable tints of to-day has developed with the increased volume and discriminating demand of the trade. The first paints ready for use were made in 1852. They were tinted colors in paste form. To-day almost every conceivable shade of color is found thus prepared in hermetically sealed cans.

About 1857, D. F. Tiemann & Company, who had succeeded Anthony Tiemann, made carmine from cochineal, a monopoly theretofore held by France. In 1860 they made a blue soluble in water for laundry use, and free from acid, that previously made having been a mixture of ordinary Prussian blue and oxalic acid. In 1860 they established, also, the manufacture of quicksilver vermilion, which had previously been monopolized by England. The manufacture of oil and varnish meanwhile proceeded along the some lines and in response to causes similar to those affecting the paint industry. By 1860 there were three varnish factories west of the Alleghanies, and many in the Eastern States, while its consumption was steadily increasing both at home and in the foreign trades. Since then its growth in importance and extent has been steady and rapid. The lead, paint, and oil interests of the country have come during late years to certain centralizations of management, tending to greater uniformity and economy. In paints, of which lead still remains one of the most important components, this movement has resulted in the formation of the National Lead Company, which controls the greater part of the output of white lead in this country. In itself this company includes and operates its own oil and paint-grinding mills, as well as the lead factories proper, and with a capitalization of about $30,000,000 is the largest single interest in the paint business, although there are many great individual firms equally prominent relatively to their output. There is also a large interest concerned in the import branch of the paint and color trade, who handle foreign earths, leads, and mixtures.

American colors are found in many foreign countries, and the trade is one that will grow. From a total exportation of only about $20,000 in 1835, the shipments sent abroad in 1900 amounted to over $1,000,000. See LINSEED OIL INDUSTRY.

Painted Quail. See QUAIL.

Painted Terrapin or **Tortoise.** See TURTLE.

Painting, in the fullest meaning of the word, signifies the application of color to any surface, for the purpose of making it more attractive to the eye, or as a preservative of the substance painted, but in this article the word is restricted to the art of painting, that is, the art of representing objects, real or imaginary, on a flat or nearly flat surface by the use of designs in line and color. The origin of this art, like that of several others known to civilization, is lost in the mists of those prehistoric ages on the banks of the Nile which the researches of modern Egyptologists have pushed back, apparently, to the distance of 80 centuries. Some few traces of it among the unknown autochthonous races who preceded the long lines of the dynasties of Upper and Lower Egypt have been but recently assigned to their proper sources; the art of the dynasties of the Pharaohs and the Ptolemies, notwithstanding their duration by centuries, presents certain striking characteristics which distinguish it from all others. It was strictly a conventional and symbolic art, largely

an official art, devoted to the service of the monarch and of religion, and, within these limits, a decorative art. Sculpture was subservient to architecture, and painting — except on the walls of the tombs and in the papyri — to sculpture. Our knowledge of painting is derived from the very numerous examples preserved on the walls of the temples and the tombs, on the mummy cases and the sarcophagi, on the funeral tablets, and the illuminations and vignettes on papyrus and linen. The conventions in which the art remained bound — with but few exceptions — were established in the earliest ages; they embraced all design, religious and secular, requiring that human figures and those of animals should be represented in profile, defined by an outline, and in flat color; for landscape and architecture there was adopted a curious and ingenious combination of drawing, both in ground plan and in elevation, to express the scene in the simplest and clearest manner possible. The background was left blank, or filled with a flat tint; the required lucidity and directness of expression forbade the use of linear or aërial perspective, or any attempt at modeling or variation of the conventional local color. On the inner and outer walls of the temples the outlines were incised, sometimes very deeply,— the figure within these outlines frequently rounded down to the bottom of this incised outline; on the walls of the tombs the painter replaced this outline with one made by his brush. He worked directly on a coat of white stucco, applied over a rough-cast to conceal the joints and the roughness of the masonry wall; of colors — derived mostly from mineral sources — he had, at the most flourishing period of the art, as many as 18 or 20, as we know from wooden palettes of the 18th dynasty, which have been found. These colors were mixed with water and gum tragacanth, possibly with honey; some mummy cases of the later dynasties have been painted in encaustic, and in some cases the eyes and eyebrows of the mummy masks are in enamel. These colors have retained their brilliancy to a remarkable degree through the ages; very few of the paintings are cracked. The artist worked with brushes of reeds or rushes, the ends of which were soaked in water until their fibres separated, and they were adapted to the finest and most delicate work. In the papyri — as in the many hundred copies of the Book of the Dead extant — the illustrations stretch along the top of the page, like head-pieces, or are inserted as vignettes, or initials, or full-page pictures. In many cases they are merely outline sketches in black or red. In general, figures of men are colored a dull red and those of women a light yellow, the gods and the genii of the dead may be of positive greens and blues, and the animals are frequently spotted. The colors are always pleasing and harmonious, and on the largest wall spaces a comprehensive and well sustained color-scheme is frequently found, designed and carried out with true artistic skill. On the outer walls, exposed to full sunlight, and in the deepest recesses of the tombs, the colors are most vivid; in the intermediate chambers of the tombs they are more quiet and discreet, to suit the tempered light. (See EGYPT.)

Greek and Roman Painting.— In the middle of the 6th century before Christ Greek painting was technically no farther advanced than that of Egypt or Assyria. Greek writers speak with the same enthusiasm of the works of their great painters as of those of their sculptors, but it is only by these descriptions, and by some supposed copies and adaptations in the work of the craftsmen, mural painters and mosaicists, of the decline of the art under the Roman domination, that we can form some definite conception of these masterpieces. It is noticeable that the rhetoricians are especially impressed by the ability of the painters to represent objects so naturally as to mystify the spectator. The development of the art through its various phases can be fairly well traced in the wall paintings discovered in Etruscan tombs; it practically embraced all subjects, mythology, history, scenes from daily life, landscape, marines, portraits, animals, tragic and satirical representations, still-life, ornament and decoration, and miniatures. Composition, order, linear and aërial perspective, chiaroscuro, a knowledge of the human figure extending to foreshortening, action, expression by gesture and by countenance, all were included. The color work was even extended to the tinting or painting of statues (though there seems to be no proof that the Greeks colored the nude parts of their marble statues) and to the moldings, triglyphs and other ornaments of their architecture. Praxiteles (q.v.) when asked which of his works in marble he valued the most, replied: "Those on which Nikias (the painter) has set his mark."

In Pompeii, the painted portions of the temples are always finished in stucco or plaster. Portrait painting was apparently more in favor among the Romans than among the Greeks. The long series of painted vases — from the earliest examples of the "Pelasgic" or pre-Homeric period down to the disappearance of the art about 65 B.C.— was but one of the features of this comprehensive school of painting. The only examples of easel pictures which have been preserved are a few small paintings on marble and slate, found in Herculaneum and in Etruscan tombs.

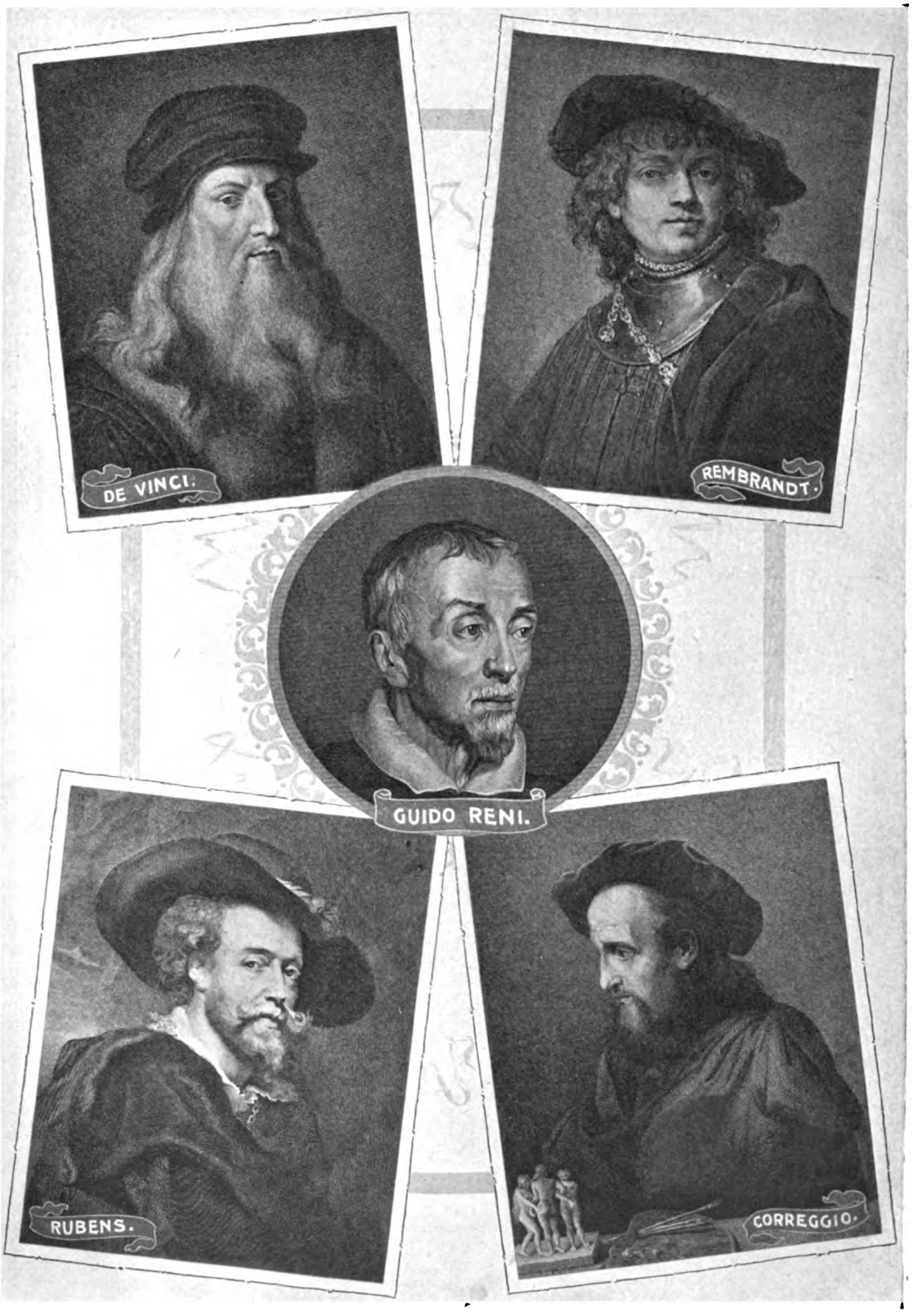
Apelles introduced the use of a glaze or varnish over the completed tempera painting. In the latter, the colors were tempered with a glue, a gum, honey, white of an egg, juice of the fig, milk, or other glutinous substance, soluble in water, that served to bind them; or with wax or some resin, when these materials had been rendered by any means vehicles that could be worked in water. In tempera painting (see TEMPERA), colors were applied to the dry wall; in fresco (see FRESCO), to the wall while the plaster was still wet. Both methods are found in Pompeii; the backgrounds always in fresco and, generally, the architectural framing and ornaments; the small figure panels in the centre are generally painted in tempera on the fresco background. In fresco, no colors except earths were used, and these were protected by an encaustic varnish, which also served to give them more brilliancy. Encaustic painting was used only for pictures on tablets or on canvas; in this process naphtha, or spirits of turpentine, or any volatile, ethereal oil that will evaporate, leaving the wax colors firmly fixed, can be used as menstrua to liquify the wax. In the usual method, when the colored sticks of wax and resin have been melted over a fire the colors are applied broadly with a brush and then blended by means of a metallic

instrument, a spatula or cestrum (generic name *cauterium*), at times used very hot. The same instrument is used to finish the painting by taking, while still hot, cold wax colors and blending and grading them on the first painting. The colored sticks of wax and resin, softened by the addition of an oil, may be applied from a hot palette with a brush and then melted and modeled with the cestrum. The same sticks, softened by the addition of an oil, may be used directly, like crayons of pastel; or, when dissolved in an essential or volatile oil, applied with a brush; but these two methods, not involving the use of heat, are not, strictly speaking, encaustic painting. In all cases, the ancients prepared their walls very carefully before painting, the final surface receiving a firmness and consistency almost equal to that of marble. Their colors were almost exclusively mineral, the only animal substance known being the slimy matter of the purple snail, mixed with chalk,— this purple unknown to the modern palette.

Byzantine and Early Mediæval.—The influence of ancient art on that of the early Christians was long in disappearing — notwithstanding the widely divergent tendencies of the new religion. Inheriting the Jewish aversion to idolatry, and to works of material imagery, the Fathers of the Church declaimed against all artists,— Tertullian denounced them as persons of iniquitous occupations. The paintings and decorations in the Roman catacombs — rediscovered at the end of the 16th century,— especially those in the earliest cemeteries, bear a great resemblance to the ancient wall paintings. Orpheus playing on his pipes reappears as the youthful and beardless Christ surrounded by his sheep, and Hermes Kriophoros, carrying a ram on his shoulders, as the Good Shepherd. The bearded type of the Saviour, with which we are familiar, was not generally adopted till later, in the earliest mosaics. As the Church increased in numbers and power the primitive prejudices disappeared, but early Christian painting shared in the general decline of all the contemporary art of the Empire. Occasional efforts were made by the emperors to check this decadence, by Constantine and by Valentinian, Valens and Gratian in the 4th century; and in the 5th, by Theodoric at Ravenna, the capital of the Ostrogothic kingdom in Italy. The first mention of church painting is found in a canon of the council held at Illiberio (Granada), Spain, about 305 A.D.; but the mediæval wall paintings have nearly all disappeared,— very largely by conflagrations. Our insufficient knowledge of the early mediæval painting is principally derived from the mosaics, the most important being at Ravenna and Rome, and from the miniatures and the illuminated manuscripts. In Byzantium, the mosaic wall decorations were not confined to the churches but were also employed to celebrate the deeds and the power of the monarchy, as in the Chalkê, the great state hall of Justinian's palace. With the establishment of the Lombards in Italy, the ideals, the freedom and spirituality of both the Church and its art, fell into even stricter bondage. The subject of the Crucifixion first appears in painting in the latter part of the 6th century, the figure of the Saviour frequently clad in a long purple robe, and sometimes wearing a regal crown. The classical period of early Christian art came to a close with the outbreak of the Iconoclastic schism, in the beginning of the 8th century.

The mediæval style was formed by the gradual union of these classic traditions with the hereditary art of the Western barbarians conquered by the Empire or who overran it. Each of these races contributed an individual note,— the Irish monks excelled in illuminating manuscripts, their art being continued by the Anglo-Saxons; under Charlemagne mural painting, both sacred and profane, was greatly in favor, though nothing now remains save miniatures; but these primitive impulses did not extend south of the Alps until the Romanesque period, ending in the 13th century. The first indications of Gothic art appear in the miniatures toward the close of this period,— in the angular and broken folds of the draperies, indicating that tendency which was to "govern the human sense of form in all its modes of expression, down to handwriting inclusively."

Later Mediæval-Gothic.— It was in France that Gothic architecture took its origin; and there, too, that the other arts took the lead in Europe, in the middle of the 12th century. Painting gradually escaped from the domination of the priestly order; the painters became specialists, working exclusively at mural paintings,— particularly so in the northern countries. Hence, a certain growth of individuality of conception, a tendency toward subtlety and mysticism, an attempt at realism, including study from nature, — the whole, as yet, much hampered by tradition. After the middle of the 14th century there appeared very definite signs of an appreciation of the full capacities of the art of painting and serious attempts to realize them. In this art, including miniature painting in books, France took the lead, as she had done in architecture. The development of Gothic architecture, as it diminished the spaces for wall paintings greatly increased that of the windows, and thus gave a great impetus to the noble art of glass painting (q.v.). In the 14th century, distinct schools of painting begin to appear, as, in Germany, those of Prague, of Cologne, of Westphalia, etc., and even the names of individual artists become known; the panel paintings of the French and the Flemings bear a general resemblance to those of the Lower Rhine; but in Italy the art, both in conceptions and in technical methods, followed distinct national lines,— preparing the way for the Renaissance. Foremost among these precursors were the Tuscans, Niccola Pisano (q.v.), the sculptor, and Giovanni Cimabue (q.v.), the painter. The first great epoch in modern painting is considered to have been that signalized by the mature works of Giotto di Bondone (q.v.) (1276–1336), a pupil of Cimabue, who was acclaimed by his contemporaries as the greatest genius in the arts of Italy. To their astonished eyes, Giotto's power of presenting objects naturally was so great that "the thing itself" was reproduced. With this he combined a great command of the arrangement and execution of monumental mural painting, and a freedom from the traditions both of the Byzantine manner and the Northern Gothic, while reproducing in his works many of the decorative ideas of the ancients. Chief among his followers was Andrea di Cione (q.v.), called L'Arcagnuolo, or, in the contracted form, Orcagna. The painters of the school of Sienna ranked almost in importance


DE VINCI.
REMBRANDT.
GUIDO RENI.
RUBENS.
CORREGGIO.

Mau

with those of Florence; and in the Campo Santo of Pisa are still preserved some of the greatest monuments of fresco painting, executed by various artists, of this closing period of the Middle Ages.

China and Japan.—The technique of the art of painting in China and Japan is founded primarily on the caligraphic dexterity which was the chief ideal of the older Chinese painters and their Japanese followers, and which is still held in high honor. The ancient art of handwriting was based upon a system of representing or symbolizing the thing indicated, and both it and the art of painting were fettered by traditions that were as binding as those of Egyptan art. Linear design has remained the important element even in painting, the outline being always retained. As an art primarily decorative and suggestive, and not realistic, its fundamental principles differ widely from those of all the European schools. The Japanese themselves compare their art of painting — which they consider the richest and most important, the most intimate expression of the national character — to «sketching.» (*La peinture japonaise a la caractère d'une esquisse,* says the official work published by the Japanese Imperial Commission at the Exposition Universelle of Paris, 1900.) As a *sketch,* or, rather, as a work in which only the essentials are retained — appealing to more artistic and more intelligent taste than the finished realistic picture,— these paintings dispense with careful definition, with chiaroscuro and perspective, qualities neglected by both the Chinese and Japanese masters in their search for idealistic design and decorative feeling. The care bestowed upon the line leads to a very skilful characterization and suggestiveness in design,— marred by the limitations and conventions of both national arts; the generally tempered and restricted color-scheme permits of the most subtle and beautiful tones, and of a very artistic rendering of aërial perspective in the landscapes, especially in the Japanese. The painter does not hesitate to leave his canvas or his paper untouched in spots so as to concentrate on the principal motif; he is in search of an abstract beauty, not of that of the individual — in accord with the Buddhist principle of the social development rather than of that of the individual. This is peculiarly true of the Butsu-yé, or picture of the true Buddhist school, which is distinguished from the works of the secular artists by certain distinctive qualities. In China, nothwithstanding the number of epochs which the art of painting has traversed and the varying influences to which it has been subjected, it has retained throughout a general unity of principles. The Japanese claim that in deriving their art from the Koreans, the Chinese and the Hindus, they have bettered their instructions and given their own style to the art,— a greater charm and subtlety of line, a greater delicacy and beauty of tone in the color. Both nations refer the origin of their art to a legendary era, the Japanese claiming 13 centuries of duration, and the Chinese historians ascribing the invention of painting to Che-hoang, minister of the Emperor Hoang-ti, in the 27th century before Christ, contemporary with the introduction of writing by Tsang-hie — these two personages considered by some authorities to have been identical. No satisfactory record of an individual painter, however, appears before the 3d century A.D., nearly 200 years after the introduction of Buddhist pictures and images from India. According to an ancient Japanese writing, the history of pictorial art began in that country in the reign of the Emperor Yuriaku (457–479 A.D.), introduced by a Chinese painter of royal descent, Nanriu or Shinki. It is probable that Japanese art took its real birth at the period of the introduction of Buddhism in the middle or the 6th century.

Persia and India. It was from China that Persia originally derived the arts of architecture, painting and ceramics; for the second of these, the general principles and the technical methods, even to the vellum upon which the paintings were executed, were Chinese. Later, many of the elements of the art were adopted from that of the Arabian Caliphate, an art which had been born in Egypt and developed in Syria. Under the dynasties of the successors of Genghis Khan (1199–1335 A.D.), painting in Persia assumed definite forms and characteristics; indeed, it is asserted to have been borrowed from Turanian, Dravidian, Greek, Sassanian, Mongol, and European sources. During the Mahommedan domination its influence was extended to India, where it succeeded the native traditions. The art of the two countries under the Mongol emperors was practically the same; in both, the ancient mural paintings having almost completely disappeared, it is preserved only in the miniatures. Modern Hindu painting and sculpture are both in lamentable decadence; the former, never having even undertaken to represent nature, is content with traditional and decorative formulas.

For painting of Europe after the close of the Mediæval epoch, see RENAISSANCE PAINTING; POST-RENAISSANCE PAINTING.

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Pairing, in legislative and other assemblies, a practice by which two members belonging to opposite parties or factions agree that both shall be absent for a specified time, or that both shall abstain from voting on a particular question. Thus a vote is nullified on each side. The terms pairs and pairing-off are also frequently used.

Paisley, pāz'lĭ, Scotland, a manufacturing town of Renfrewshire, on the White Cart, about three miles above its confluence with the Clyde, and seven miles west-southwest of Glasgow. It consists of an old town on the west or left, and a new town on the east or right bank of the river, communicating by three handsome bridges. The most noteworthy building is the restored Abbey Church of a monastery founded in 1163 by Walter, son of Alan, the first of the house of the Stewarts. Other noteworthy edifices are the new county buildings, the old county buildings and prison, a quadrangular pile in the castellated style; the town-hall, an imposing building in the classical style; the Neilson educational institution; the buildings containing the free library and museum; the Coats Observatory, and the Coats Memorial Church (Baptist). Paisley has been long noted for its manufactures, especially of textile goods. The shawl manufacture, introduced about the beginning of the present century, and long a flourishing industry, is not now a staple, but the textile manufacture is still large, though the chief industry is that of sewing cotton, for which Paisley is celebrated all over the world. Wilson the ornithologist, the poet Tannahill, and Prof. Wilson (Christopher North) were natives of Paisley, which possesses a bronze statue of the ornithologist and of the poet. Paisley, the mediæval *Passeleth,* is a town of ancient origin, having been at one time a Roman station under the name of *Vanduara.* Pop. (1901) 79,355.

Paixhans, Henri Joseph, ŏñ-rē zhō-zĕf pāk-säns, or pāk'ạnz, French general: b. Metz 22 Jan. 1783; d. Jouy-aux-Arches 19 Aug. 1854. He entered the artillery after being graduated at the Ecole Polytechnique, fought under the Empire with great bravery, especially at the siege of Paris in 1814, and in 1848 became division commander. From 1830 to 1848 he was a member of the House of Deputies. Paixhans invented a howitzer called by his name, which carried hollow shot and cylindrical, conically pointed shells, also of his invention. His later years were particularly devoted to the improvement of floating batteries. He wrote several valuable studies of army and navy ordnance.

Paixhans Gun. See ORDNANCE.

Pakawa, pä-kä-wä'. See PINTO.

Pakenham, pāk'ĕn-ạm, SIR **Edward Michael,** British soldier: b. County Westmeath, Ireland, 19 March 1778; d. near New Orleans, La., 8 Jan. 1815. He was a lieutenant in the British army in 1794 and served with distinction under his brother-in-law, the Duke of Wellington, in the Peninsular and French campaigns. In 1814, after the death of General Ross at Baltimore, he was appointed to the command of the British forces there. He led the expedition against New Orleans, where his forces were defeated by Gen. Jackson, and was killed in battle 8 Jan. 1815. See NEW ORLEANS, BATTLE OF.

Palæobotany, or **Fossil Botany,** the branch of palæontology which treats of fossil plants. Under this term is included the study of all dead vegetable matter which has become fossilized or has left its traces in any part of the earth's crust or in its superficial deposits.

History.— Fossil remains of vegetation, in the form of petrified wood, were described centuries ago by writers on natural history, and leaf impressions were described and figured by Johann Daniel Major, in his 'Lithologia curiosa, sive de animalibus et plantis in lapides versis,' published at Jena in 1664, and by Eduard Lhwyd, in his 'Lithophylacii Britannici Ichnographia,' published at London in 1699, but it was not until the early part of the 19th century, when Baron von Schlotheim issued his 'Abhandlung über die Kräuter-Abdrücke im Schieferthon und Sandstein der Steinkohlen-Formation,' and his 'Beschreibung merkwürdiger Kräuter-Abdrücke und Pflanzen-Versteinerungen, ein Beitrag zur Flora der Vorwelt,' at Leipsic in 1801 and Gotha in 1804 respectively, that the study of fossil plants was placed upon a scientific basis. Since then the subject has received constantly increasing attention, and it is now recognized as co-ordinate in importance with palæozoology, in interpreting the age or the succession of geologic formations, or in discussing the evolution of allied living organisms.

Principles.— The study of the extinct flora of the earth has shown that our living flora has been

Geologic Time Divisions	Geologic Periods	Plant Ages	
Neozoic	Modern Quaternary Tertiary	Age of Spermatophytes	Age of Angiosperms
Mesozoic	Cretaceous Jurassic Triassic		Age of Gymnosperms
Palæozoic	Carboniferous Devonian U. Silurian, L. Silurian, Ordovician. Cambrian	Age of Cryptophytes	Age of Pteridophytes
Eozoic	Huronian Laurentian		Age of Thallophytes

evolved from simple forms, low in the scale of life, through forms successively higher and more complex. Some reached a maximum of development far back in geological time and then retrograded or became extinct, while others have continued their upward development to the present day. The period of maximum development of any type is known as the "age" of that type, and thus it is possible to divide geologic time as a whole into a succession or series of plant ages and to designate each age by the name of the particular type of vegetation which was predominant at that time. Such a series, based upon the known facts of palæobotany, would be indicated in the preceding table.

In a similar manner other subdivisions of the vegetable kingdom could have their respective "ages" indicated and the table could be

made to show when each family, order or class of plants was in the ascendant.

The general character or *facies* of any fossil flora will always determine the time division to which it belongs; the identification of a few of its component genera is sufficient to determine the period, and the identification of certain typical genera or species will determine the exact or approximate stratigraphic position of the particular formation or strata of the period in which they occur. It is the recognition of these facts which has led to the acceptance of the broad principle that "great types of vegetation are characteristic of great epochs in geology, and it is impossible for the types of one epoch to occur in another."

The above principle, however, requires a modified application when floras of widely separated localities are under consideration, for the reason that evolution has not always maintained a uniform rate of progress in all parts of the world. In some localities it has been more rapid than in others, hence the same types may occur in different parts of the world in strata that are not quite contemporaneous; but the order of sequence of types, in all localities, has always been found to be the same.

Botanical Development.— On theoretical grounds plant life is assumed to have preceded animal life, not only for the reason that the latter is dependent upon the former for its existence and sustenance, but also because plants are lower in the scale of life than animals and are capable of existing under conditions that would be fatal to the latter. If the "nebular hypothesis" is accepted for the origin of our earth, there must have been a long period of time when its land and its waters were at a temperature too high to admit of the existence of any kind of life; but we know that some of the lowest forms of vegetation, represented by the lower thallophytes, can and do live in water at a temperature which is fatal to all other forms of life, hence it is assumed that these were the first to appear. This assumption is also strongly emphasized by the fact that the earliest recognizable fossil forms are thallophytes. Exactly what the primitive vegetation of the earth was like can not be determined, for the reason that its remains were either entirely obliterated, or so altered, by the metamorphism to which all the older rocks were subjected, that its original characters are lost. Its former existence, however, is indicated by the presence of carbon, in the form of graphite, in these rocks, and graphite is known in numerous instances to have resulted from the metamorphism of coal derived from vegetation.

Thallophytes.— The microscopic size of the lower thallophytes and the cellular structure of the others are factors which would make them poor subjects for preservation, and their comparative rarity as fossils is therefore to be expected. The schizophytes, representing the agencies of disintegration and decay, must have been present at the very beginning, but their assumed existence is purely theoretical. Fungi also play a very unimportant part in fossil botany. A few of the woody forms have been recognized and they are also represented by thallus and mycelium fragments, and presumably by certain indications of disintegration, in the tissues of higher plants, notably in those of the Carboniferous Period, and by spots or other markings on leaves, bark, or wood, from more recent formations. About 400 species, included in about 70 genera, have been described. The lichens are also but little known as fossils, and such as have been discovered are fragmentary and unsatisfactory. They consist mostly of flakes, attached to pieces of fossil wood, or enclosed in amber, and have not been recognized in strata older than those belonging to the Tertiary Period. Seaweeds and fresh-water algæ are abundantly represented by casts, tracings, and markings of various forms, and occasionally by the remains of the stems, when they were of sufficient consistency for preservation. Many of these forms, originally described as algæ, are exceedingly problematic, and others have been subsequently shown to be mere inorganic markings or to be due to the tracks, trails or burrows of animals. Even if all the doubtful forms are eliminated, however, a sufficient number remain to demonstrate their existence as far back as the Cambrian Period, and they are represented in the rocks of every succeeding period. The diatoms are most abundantly represented, and they are also the most perfectly preserved of all the thallophytes, by reason of their silicious tests. They occur from the Cretaceous Period upward, forming beds of "tripoli," in various parts of the world, notably at Bilin, in Bohemia, and Richmond, Va. The genera and species are largely the same as those now living. The Characeæ have been identified, by means of their fruit cases, in rocks of Devonian age in North America, and also by stem fragments in those of the Jurassic and later periods.

Bryophytes.— Mosses and liverworts are but sparingly represented as fossils, and are practically unknown except in Tertiary and more recent deposits. All that have been identified are either the same as or very closely related to living species. Peat is largely composed of the remains of mosses, mostly belonging to the genus Sphagnum.

Pteridophytes.— The ferns, and their allies, lycopods and equisetums, compose the most interesting of any group of fossil plants. They had their origin far back in geologic time, probably in the Lower Silurian (Ordovician) Period. In the Devonian they had become well established and their maximum of development was reached in the Carboniferous, at which time they probably formed at least 75 per cent of the entire flora. After that they steadily declined, not only in numbers but also biologically, and their present living representatives are mere degenerate descendants of the gigantic forms which preceded them. The ferns certainly began as far back as the Devonian Period, and probably earlier. They are the best known of all fossil plants, and were the first to receive serious attention and study from palæobotanists. This was largely due to their extensive representation in connection with the coal of the Carboniferous Period and their discovery as an incident of mining operations, through which they were being constantly brought to light. They probably contributed 50 per cent to the entire flora of that period, but this proportion declined to about 30 per cent in Mesozoic time and in Neozoic to about 5 per cent. In general appearance the Palæozoic forms differed but little, except in size, from those of today, and many of the Mesozoic forms were apparently identical with living genera, while

some Tertiary species are hardly to be separated from living ones. Equisetums, or plants very closely related to them, are definitely recognized in rocks of Devonian age, and, like the ferns, they rapidly developed in the Carboniferous Period. These Palæozoic forms are represented by the extinct genera *Calamites, Calamodendron,* etc., the genius *Equisetum* not appearing until later on, in Mesozoic time. The lycopods probably had their beginning as far back as the lower part of the Upper Silurian Period, and reached their maximum of development in the Carboniferous, at which time they were, next to the ferns, the most important element in the flora. Their gigantic trunks and limbs are known under the generic names, *Lepidodendron, Lepidophloios,* etc. These genera became extinct at the close of Palæozoic time and were succeeded by others closely related to or identical with the living *Lycopodium* and *Selaginella.* Other types of doubtful botanical relationship, but apparently closely related to one or another of the above groups, were the genera *Sphenophyllum* and *Sigillaria.* The rhizocarps are known, to a limited extent, as fossils; but like their living representatives are small and inconspicuous. Well preserved species of *Salvinia* have been found in rocks of Cretaceous and Tertiary age and remains of questionable relationship in rocks considerably older.

Spermatophytes.— The time of origin of this sub-kingdom of plants is more or less obscure, but it probably dates as far back as the Upper Silurian Period, and they are definitely known to have been in existence in the Devonian. Their development was slow and they did not assume any degree of prominence until Mesozoic time, when they became the dominant type of vegetation and have continued as such up to the present time.

The gymnosperms, of which our coniferous trees and cycads are the best known representatives, are the oldest type. The extinct genus *Cordaites* is known in the Devonian Period, but as a class they were of little numerical importance until Mesozoic time, when, in the Triassic and Jurassic Periods they reached their maximum of development and became the dominant type of vegetation, forming perhaps 60 per cent of the flora. Since then the cycads have almost disappeared, except in the warm parts of the world, but the coniferous trees, although in diminished numbers, are yet an important element in the living flora of all sections. Several ancient genera, such as *Sequoia,* to which the giant trees of California belong, and *Gingko,* represented only in our living flora by the maidenhair tree of Japan, were formerly of world-wide range, but are now restricted to limited localities and unless protected are liable to become extinct in the near future.

The angiosperms may have had their origin in late Palæozoic time, but the earliest remains which have been satisfactorily identified are not older than Mesozoic. Toward the close of the Jurassic Period they appeared in considerable numbers and subsequently developed so rapidly that in the Cretaceous Period they had become the dominant type and they have maintained this position ever since. The Monocotyledones are relatively not well represented as fossils and their origin is obscure. On theoretical grounds they probably antedated the more highly developed Dicotyledones, but satisfactory evidence on this point is lacking. Fan palms are known from the upper Cretaceous and these were probably preceded by grasses or sedges, but their remains are mostly found in deposits of Tertiary age. The Dicotyledones are first recognizable in certain archaic forms, from the Jurassic or lower Cretaceous horizons of North America and Europe, to which Saporta gave the name "proangiosperms." In some of these the dicotyledon type, as we know it in our living flora, is merely indicated rather than expressed, and it is almost impossible to classify them satisfactorily with any living allies. From these, however, the modern generic types of the dicotyledons developed so rapidly that it was essentially a modern flora, in all except its species, by the middle of the Cretaceous Period, and what are apparently living species began to appear in the early Tertiary. At the close of the Tertiary Period it is probable that nearly all the species were identical with living ones, as all the remains which have been found in Quaternary deposits are identifiable or referable to species now in existence.

Relation to Botany.— If the general development of the vegetable kingdom in the past is broadly viewed it becomes at once apparent that this development or phylogeny follows very closely the modern conceptions of the interrelations, or taxonomy, of plant-life as it now exists, and it is significant that all the changes which have been made from time to time in taxonomic arrangement have constantly brought it closer and closer into harmony with the known facts of phylogeny, until, at the present time, all scientific systems of classification are based upon the principle of development from lower to higher forms, and nearly all catalogues or lists of plants and manuals or text-books of botany are arranged in accordance with this principle. Palæobotany has thus been of great assistance to botany in placing it upon a sound and philosophic basis.

The demonstration of the fact that the vegetation now in existence is merely the remnants of that which formerly existed, has resulted in solving, or at least in throwing a flood of light upon, many of the problems that puzzled the early botanists. Wide gaps between living genera were bridged by the discovery of extinct forms, and isolated or monotypic genera, such as *Liriodendron,* of which our tulip tree is the sole living representative, *Sassafras,* which also contains but the one species, etc., were shown to have been composed, in the past, of a large number of species, and that the present generic isolation is due to the extinction of all but one of their former component species. Many of the apparent anomalies in connection with the geographical distribution of certain living plants have also been cleared away by the discoveries of palæobotany. A number of genera, for example, are known to be restricted to the two widely separated regions of Eastern Asia and Eastern North America and impossible theories of migration were proposed in order to account for such phenomena, until the fossil representatives of the genera were found, and the fact was demonstrated that they were once of world-wide distribution but have become extinct in the intermediate regions. The presence of abnormal or apparently useless organs in living plants has also been explained on the theory of atavism or

reversion to former ancestral characteristics and the changes in form through which all plants pass, from youth to maturity, have frequently been shown to be identical with, or closely similar to, ancestral changes in the development or evolution of the types to which they belong. These and numerous other phenomena would have been impossible of rational explanation without the aid of the facts made known by palæobotany.

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Palæog'raphy (Gr. παλαιος, old; γραφειν, to write), the science of ancient handwriting. It is occupied with the materials, the characters and use of written documents with a view to determine their date, authenticity and place of production. As a general term palæography proper includes neither epigraphy nor diplomatics. Epigraphy is the science of inscriptions found on stone, metal or pottery. Diplomatics is concerned only with legal documents, and although it perhaps gave the first impulse to the study of palæography it lost its main importance after the French Revolution, and the science of handwriting is now chiefly occupied with manuscripts of literary or historic interest.

Materials.— In the most rudimentary stage of civilization leaves, bark, or woven cloth were employed for the pages of books or material on which to write matter of any kind. Wax tablets on which letters could be stamped or cut with a stilus, or needle of metal or bone, were used in ancient Italy and through the Middle Ages in France. The black wax was poured on to a rimmed quadrangular piece of wood, or tablet, and many such pages were often bound together so as to form a codex or volume. Codices of this sort have been discovered among the ruins of Pompeii and elsewhere. A species of paper called papyrus was also employed; it was made of the pith of an Egyptian sedge. This pith was cut into strips which were laid side by side on a flat surface, and a second layer of strips superimposed at right angles. This was then subjected to heavy pressure and the natural gluten of the substance caused the two layers to adhere and form a smooth sheet which, when dried, was ready for use. Many rolls of this paper have come to light in old Italian towns, notably at Herculaneum and Ravenna, but papyrus was extensively used in Egypt and Greece as well as in the Asiatic cities on the coast of the Ægean. It was also employed during the Middle Ages, and the popes regularly wrote on papyrus until the end of the 11th century. Parchment took the place of papyrus about the 1st century A.D., taking its name from Pergamos — *papyrus Pergamenus,* or paper of Pergamos — where it was first made in perfection; although skins of animals were used for writing upon as early at least as 500 B.C. Parchment manuscripts are found in square pages, and take the form of the modern book; they are not rolled so as to make what the Romans called *volumen,* a scroll or volume, but bound together in consecutive pages like wax tablets in the codex. It is of course from Egypt that the earliest papyri come. The 'Papyrus Prisse' was found in a tomb of the 11th Dynasty and antedates Exodus by several centuries.

Characters.— It is impossible within the limits of the present paper to discuss Egyptian palæography (see HIEROGLYPHICS) and the hieratic or demotic papyri, much less the Chinese, Pali, Indian, Syriac, Hebrew, Persian or Arabic handwritings and manuscripts. The principles of palæography may be seen in their simplest form from an examination of Greek and Latin alphabets, and a consideration of some of the most interesting palæographical remains written in those letters. The first obvious variety which we meet with in both Greek and Latin manuscripts of the same period, is what we may call the book hand, and the cursive hand, which correspond roughly with our modern printed and written lettering. The book hand is that of the professional scribe or amanuensis and is stiff and regular but thoroughly legible. The cursive hand is irregular and careless, as if rapidly produced. The one is employed by those who write out what is to be permanent and readable by anyone; the other is for private memoranda, letters, and accounts. For convenience, the letters in a book hand may be divided into two classes, majuscule and minuscule. The majuscule comprise capital and uncial letters. The letters employed in epigraphy or inscription writing furnish the pattern for these capitals, which are square and stiff. The word uncial means inch-high, and is a term of exaggeration used by Saint Jerome in the sense of tall or handsome. The uncial letter is of the same proportions as the capital but is boldly curved, and is clear to the eye as well as often extremely elegant in appearance. The other book hand, the minuscule, was a combination in its principles of the cursive and uncial; it derived its name from the fact that it was never as large as either type of the majuscule. The Latin and Greek uncials very much resemble each other, but in the cursive hand the distinctions are very noticeable.

Greek Palæography.— Greek papyri may be divided into three classes according to their period. The Ptolemaic manuscripts were produced 323–30 B.C.; the lettering is bold and flowing. The Roman papyri were written in the period between Augustus and Diocletian (31 B.C. to 284 A.D.) and their lettering was fluent and finey rounded. Equally recognizable by the expert is the large and showy style of the Byzantine manuscript, which belongs to the period between 360 and 640 A.D. The early uncials of the Ptolemaic period are the oldest Greek manuscripts which are extant and have been found in tombs where the papyri have been buried. Perhaps the earliest was produced in the first half of the 2d century B.C. Greek papyri earlier than the Christian era are not uncommon. Among them are fragments of Homer and Hyperides, the Athenian orator. The earliest Greek cursive manuscript which is

extant consists of letters and memoranda made by Ptolemy, son of Glaucias, who lived as a recluse in the Serapeum or precinct of Serapis 170 B.C. There are extant about 300 vellum codices, the oldest of which may be set at 506 A.D. The three great Biblical codices are considered the production of the 4th century, the Codex Alexandrinus of the 5th. The earliest minuscule script yet discovered is found on the private papers and business memoranda of Aurelius Pachymius, a purple dye merchant 592–616 A.D. Ligatures began to invade cursive calligraphy at the beginning of the 13th century, and were imitated in the earliest printed books.

Latin Palæography.— In Latin manuscripts there were four scripts employed in books, these being, capitals, uncials, semi-uncials and minuscules. Capitals are either Square, having their lines at right angles, or Rustic, in which the ends are twisted and the cross bars oblique and curved. Of the Square capitals the Saint Gall Virgil of the 4th century affords the best example. The character of the Rustic is well exhibited in the four great manuscripts of Virgil, the Codex Vaticanus (4th century), Codex Palatinus (5th century); Codex Romanus (6th century) and the Medicæan Virgil (5th century). The Uncial Latin character was a modification of the angular and rigid epigraphic lettering on tombs and monuments. This is especially apparent in E, M, V, H. The tails of P, F, Q, and R hang below the line, while the upright of h rises above it. Good examples of Latin uncials of the earliest type are the Vescelli Gospels, as early as the time of Eusebius the historian; the Codex Bezæ (6th century) at Cambridge, England, and the palimpsest Cicero in the Vatican, also the Vatican Cicero (4th century) over which is written in smaller uncials (7th century) Saint Augustine *In Psalmos.* The large, regular uncial is supplanted in Latin manuscripts of the 8th century by semi-uncials, sometimes larger in size than uncials, but modified in form by the influence of the old Roman cursive. The Hilary (6th century) of Chapter library of Saint Peter's, Rome, is a good example of this script.

The Latin cursive was unknown to palæographists, though they had long suspected its existence, before 1875, when specimens were found in the shape of wax-tablets (55 A.D.). This script is hard to decipher, and exhibits forms out of which arose modern lower-case G, B, F, M, N, D, R, H. It was employed in a modified shape as well for civil as public uses during the Middle Ages, and many of its forms survive to-day in German script. The official Roman handwriting arose in the 16th century and the last degeneration of the old cursive is seen in the crabbed and illegible lettering of what was styled *litteræ Sancti Petri,* the official script of the popes.

The national alphabets of Europe were modifications of the Roman cursive and uncial. The Irish semi-uncial is the basis of the modern "Roman." Good examples of the Irish alphabet are St. Chad's Gospel at Lindisfarne, and Saint Cuthbert's Gospels; it passed from Ireland to Northumbria where Alcuin of York, tutor of Charlemagne, introduced it into the famous calligraphic school in St. Martin's monastery at Tours, whence it was rapidly diffused over all Europe. In the 13th century it was twisted and deformed into the Black Letter or Gothic, still seen in Germany, but after the Renaissance and the invention of printing a return was made to the beautiful minuscule of Charlemagne, improved in the middle of the 16th century by the refining influence of Italian calligraphy.

Bibliography.— For Greek palæography consult Wattenbach, 'Anleitung zur griechischen Paläographie' and 'Schrift-tafeln'; Gardthausen, 'Griechische Paläographie.' For Latin palæography, Arndt, 'Schrift-tafeln.' For Mediæval palæography: Chassant, 'Paléographie des Chartes et des Manuscrits'; 'Dictionnaire des Abreviations du Moyen Age'; Prou, 'Manuel de Paléographie.' For English characters: Wright, 'Court-Hand Restored' (1773); Taylor, 'The Alphabet.' Points useful in determining the age of MSS. are discussed in Wattenbach's 'Schriftwesen im Mittelalter' and Leist's 'Urkundenlehre.' General works, Walther, 'Lexicon Diplomaticum'; Wailly, 'Eléments de Paléographie'; Astle, 'Origin and Progress of Writing'; Silvestre, 'Paléographie Universelle'; Montfauçon, 'Palæographia Græca'; Mabillon, 'De Re Diplomatica,' and 'Nouveau Traité de Diplomatique.'

Palæontology, the science of the ancient life that inhabited the earth during the vast periods of time which have antedated the age of man. This science dates back only to the beginning of the 19th century, when William Smith, Cuvier, Brongniart, Lamarck, Blumenbach and Schlotheim initiated the study of fossil life as a distinct branch of scientific research. It was christened "palæontology" by de Blainville and Fischer von Waldheim in 1834. Erroneous and fantastic ideas regarding the nature and origin of organic fossils had prevailed till the last decade of the 18th century, interesting accounts of which, as well as of the later history of the science, may be read in the works of Zittel, Lyell, Marsh and Weller. Since the early days this science has made rapid progress until now its devotees are numerous, and they attempt to solve some of the most important problems bearing upon the origin and evolution of organisms, and upon the ancient life-history of the earth. The study of palæontology is carried on by means of fossils (q.v.) which, defined in the words of Zittel, are "all remains or traces of plants and animals which have lived before the beginning of the present geological period, and have been preserved in the rocks," and hence the successful pursuit of this science is in large degree dependent upon intimate knowledge of the closely allied sciences, geology and biology. This affiliation of palæontology to the two sciences mentioned is easily traced in the literature. The early works were descriptions of fossils, often arranged, as in Sowerby's 'Mineral Conchology,' 1812–45, without reference to their biological classification or to their relation as members of the fauna of a particular formation. In later works the tendency to diverge along two distinct lines is very apparent and at the present day we have two more or less widely separated schools of palæontologists: (1) those whose work is more intimately associated with that of the geologist; and (2) those who are essentially biologists. The former (stratigraphers, palæontologic geologists, geological biologists) are more interested

in unraveling the relations of fossils to the rocks in which they are found entombed, in studying the order of succession, the evolution, and migration of fossil faunas in the stratified rocks, in developing the use of index fossils, that is, of particular genera and species of fossil plants and animals as indicators of particular geological formations; and, by the study of the geographic distribution of fossil faunas, in solving the problems of "facies development," and of palæogeography or ancient physical geography. The second group of palæontologists confine their attention almost wholly to description of the morphology, embryogeny, and phylogeny or genealogy of fossil organisms, and give only incidental notice to the geologic associations of the fossils they handle.

Palæontology has been of great aid to zoology and botany in clearing up mooted questions of classification, in explaining the origin of various obscure structures seen in modern plants and animals, and in adding to our knowledge of the determining factors of geographic distribution. The strictly utilitarian side of palæontology, involving the application of a knowledge of index fossils to determination of the proximity of beds of ore, coal or building stone, or to ascertainment of the depth of oil, gas, or water-bearing strata, has not yet been accorded due recognition by those most interested in the exploitation of such economic materials, with the result that large sums of money have been expended in fruitless search for non-existent treasures.

The rocks of the earth's crust are classified according to their periods of origin into four great groups, each of which represents an era of immense duration, measured in millions of years. These eras are again divided into periods, represented by systems of rock formations, of which 13 are generally recognized, and the periods are again subdivided into epochs, ages, stages, and episodes, each of these smaller elements being represented by its corresponding rock-unit. With exception of the Archæan and Algonkian systems at the bottom of the scale, from which no satisfactory fossil remains have yet been obtained, each of the systems has been found to contain an assemblage of fossil organisms quite peculiar to itself, and not found in its entirety in any other system. This assemblage of fossil organisms in any system or in any geological formation constitutes its fossil fauna, which is an imperfect synopsis of the ancient life that formerly inhabited the vicinity of the ocean, lake or land basin in which the particular system or formation originated.

The faunas of two formations of consecutive age have as a rule many species in common, and on the other hand the faunas of two formations representing widely separated periods of time are found to be quite unlike, and to have few species and even few genera in common. The two extremes of such dissimilarity are naturally seen in the Cambrian and Pleistocene faunas at opposite ends of the geologic time-scale.

While formations of different ages contain diverse faunas, it is found that a single formation presents essentially the same fauna in all portions of its area of distribution, whence it follows that the fossil contents of a formation are, in general characteristic of that formation, and that they serve as a means of identifying it in widely separated districts.

TABLE OF SYSTEMS, PERIODS, AND EPOCHS, WITH DOMINANT TYPES OF LIFE.

Eras	Periods and Systems and Dominant Types	Epochs
Cenozoic Era of Vertebrates 3 million years	Quaternary (Man, Lamellibranchs)	Recent Pleistocene
	Tertiary (Mammals, Gastropoda, Insects, and land plants)	Pliocene Miocene Oligocene Eocene
Mesozoic Era of Reptiles 7 million years	Cretaceous (Pterodactyls, Dinosaurs, Echinoids)	Upper Lower
	Jurassic (Dinosaurs, Crabs, Ammonites)	Upper Middle Lower
	Triassic (Amphibia, Ammonites)	Upper Middle Lower
Palæozoic Era of Invertebrates 18 million years	Permian (Amphibia)	Upper Lower
	Carboniferous (Land plants, Crinoids)	Coal measures Subcarboniferous
	Devonian (Fish, Goniatites, Corals)	Upper Middle Lower
	Silurian (Crinoids, Corals, Eurypterids)	Upper Middle Lower
	Ordovician (Graptolites, Orthoceratites, Trilobites)	Upper Middle Lower
	Cambrian (Trilobites)	Upper Middle Lower
Eozoic 18 million years	Algonkian	Life not well known
Azoic 10 million years	Archæan	No evidence of life.

These general laws are subject to certain exceptions due to the influence of "facies development," the variations of faunal expression consequent upon changes in the physical and biotic conditions of life. These facial changes, when understood, assist rather than render more difficult the correlation of distant faunas, and their elucidation greatly aids the restoration of the ancient physiographic conditions.

Comparison of the successive fossil faunas with each other and with the modern fauna shows that there has been a slow but continuous progress in the expression of each fauna from that of Cambrian age with its unfamiliar lowly primitive types, to the highly organized animals and plants that form the dominant types of the modern fauna and flora. This progress is manifested in the successive members of the different races of animals that have descended from Cambrian ancestors, by their passing through a particular stage of evolution in each successive period, epoch, and stage. Recognition of this stage of evolution enables the palæontologist to correlate entirely new faunas or species with the known faunas of standard sections or scales.

It must not be inferred that all races living at the present day have descended from Cam-

brian ancestors. Many of our well differentiated forms of modern life can be traced back only to the beginning of the Tertiary, or into the Mesozoic, or perhaps late Palæozoic, where they are represented by species whose distinguishing characteristics are less well developed so that they can scarcely be separated from contemporaneous ancestors of other races. Such early ancestral types which seem to possess in potential state the characters of two or more later descendant races are known as "generalized types."

There are also numerous groups of fossil organisms that appeared during early days, multiplied, attained their climax, during which they were for a time perhaps the dominant forms of land or sea, and then declined and eventually became totally extinct. Such extinct groups, like the nummulites, graptolites, cystoids, blastoids, long-hinged brachiopods, orthoceratites, ammonites, belemnites, and trilobites among invertebrates; ostracoderms, stegocephalians, mosasaurs, ichthyosaurs, dinosaurs, pterodactyls, uintatheres among vertebrates; and the lepidodendrids, calamites, sigillarias, tæniopterid ferns, and cordaites among plants, are eminently characteristic of the periods in which they lived.

Facies Development and Faunal Changes.—Facies is the peculiar expression of the physical and faunistic characters of a formation at a particular point, and it is determined by the combination of climatic, physiographic, bathymetric and other conditions reacting upon the organisms of the neighborhood. Some formations, like the Devonian, present several varied facies in a limited area; others, like certain deep-water limestones of Ordovician and Carboniferous age, spread with scarcely any change over vast spaces. The chief types of facies are the littoral, corallic, sub-littoral or pelagic, abyssal, estuarine, fresh-water, and terrestrial. The characteristics of each of these, with the organisms peculiar to it, are here passed in review.

A "littoral" facies is represented by deposits formed at the shore and in the shoal water contiguous to it. It comprises conglomerates, sandstones, shales, and marls, and its organic contents consist of the remains of animals and plants of beach and shallow water habits. Such are the heavy-shelled mollusks, notably those that feed on marine plants, also abundant worms, heavy-shelled crabs, acorn barnacles, and hydroids. This facies is more common than any of the others, for the larger part of the sedimentary rocks have been made up of the products of continental erosion deposited near the coast.

Fossil coral reefs have been recognized in formations of nearly all ages and constitute a "corallic" facies. They are in all cases of shallow water origin, and their presence in ancient rocks has been generally accepted as evidence of the uniformly warm temperature of the seas in which they flourished. In the ancient reefs the coral structure has usually been obliterated by a metamorphic process called diagenesis, and the coral rock has become a dolomite. Such are the Guelph dolomites of the Silurian of New York and Ontario. Fossil coral reefs often afford faunas of many species and abundant individuals. The corallic facies of a formation is always associated, on its landward side, with a sparsely fossiliferous lagoon or saltmarsh phase, represented by red shales, containing gypsum and salt, by water-limestone, etc., as in the Salina beds of New York, and on the seaward side by a series of highly fossiliferous beds, usually limestones or calcareous shales, which correspond to the deposits of the open ocean. These latter deposits usually abound in fossils of distinct pelagic type, such as cephalopods, brachiopods, sea-urchins, crinoids, crustaceans and thin-shelled mollusks.

"Sub-littoral" or "pelagic" facies comprise the deposits laid down in the deeper water of the continental shelf, and form an intermediate phase between the littoral and abyssal types. The rocks are mostly of organic origin (limestone and lime shales), with fine-grained sandstones and clay shales. As a rule they contain an abundance of well preserved fossils, including the remains of all kinds of animals that inhabit the open sea, together with some members of the littoral fauna. Deposits of this class, with their characteristic faunas, such as graptolite shales, ammonite and pteropod limestones, have often very wide distribution, and are hence of great value for determination of geologic horizons.

"Abyssal" facies is the type characteristic of the greatest depths of the ocean. It is represented in modern time by the foraminiferal and radiolarian oozes, and by green and red muds. It is recognized among ancient rocks by radiolarian cherts of Palæozoic and Jurassic age of Europe and Australia, by the chalk of Cretaceous age of Europe and North America, and by the Pliocene Barbados earth, which latter is evidence of upheaval of great ocean-depths in comparatively recent times.

The three remaining types of facies, "estuarine," "fresh-water," and "terrestrial," are associated with spread of continental conditions. The estuarine or brackish water facies presents lagoon, bayou and estuary deposits of sandstones, conglomerates, and clay shales, sometimes alternating with limestones formed during temporary transgression of the ocean. The fossils of such deposits are species of animals that lived in brackish water, mingled with remains of the fresh-water and land fauna and flora that were carried down by river waters and entombed in the estuarine deposits. The nodular shale of Carboniferous age at Mazon Creek, Ill., is a renowned example of this type of facies. Its varied fauna comprises amphibians, fish, clams, river-snails, land-snails, scorpions, spiders, myriopods, insects, and crabs, together with abundant ferns.

"Fresh-water" and "lacustrine" facies are deposits formed in fresh-water swamps and lakes, important in the Devonian, Carboniferous, Jurassic, and Tertiary systems. The Devonian deposits, known as Old Red Sandstone in Europe and as Catskill sandstone in the United States and Canada, consist mostly of red and gray sandstones and shales containing fish and plant remains. The swamp deposits of Carboniferous and later times are represented by beds of coal, lignite and clay shales, all containing abundant plant remains, and rarely relics of the insect, crustacean, and vertebrate life. During the Cretaceous, Jurassic, and Tertiary Periods, extensive lakes existed upon the several continents, and their sandstone, shales, and limestone deposits have afforded hosts of vertebrate and vegetable remains, specially those of the Rocky Mountain region, and Europe. Occasional beds of this

facies abound in fresh-water snails and insects, as notably at Florissant, Colo. Angular breccias, conglomerates, sandstones, shales, and clays comprise the deposits of the terrestrial facies, a type which has not yet been satisfactorily investigated in all its phases. The various deposits originated either as the residuals from denudation, or as flood-plain, desert and prairie deposits. They are important sources of fossils in some cases (flood-plain and prairie phases) but as a rule their mode of origin has not been conducive to preservation of organic remains.

All of these facies are being developed in different parts of the world at the present day, and geologists find that they have been developed more or less completely during all periods of geologic time. It is, however, worthy of note that the various marine facies greatly predominated in the older Palæozoic, that the estuarine and swamp conditions were markedly developed during Carboniferous time in most parts of the world when they were associated with a remarkable increase of swamp vegetation, and that the lacustrine or fresh-water deposits were prominent during the Devonian and again during the Tertiary Periods. Each of the above mentioned types of facies has its peculiar faunal or floral aggregation of fossils, and study of these features of any formation enables the palæontologist to determine the distribution of the land and water bodies, and even to form some imperfect ideas regarding the nature of the climate, the topography of the land areas, and the character and distribution of the fauna and flora of each successive epoch and episode of time.

Palæontology and Evolution.—The researches of palæontologists upon the order of succession of fossil organisms, and upon the various modes of development of certain types from their embryonic to their adult stages, have brought to light many facts supporting the doctrine of evolution, and have also demonstrated the origin and mode of evolution of many races of living and extinct organisms. The results of these investigations along lines of profound interest may be found in the works of Beecher, Bernard, Clarke, Cope, Hyatt, Jaekel, Jackson, Koken, Neumayr, Packard, Schuchert, Scott, Smith and Williams whose more important contributions are cited in the bibliography at the close of this article. See EVOLUTION.

Periods of Geologic Time and their Faunas. —The following sketch of the series of extinct faunas that have succeeded each other as inhabitants of the waters and lands of the earth involves an elementary knowledge of the most important types of animals and plants. (See preceding Table of Systems, etc.) The history actually begins with the close of pre-Cambrian (Algonkian) time when the distribution of land and water was very different from what it is now. Regarding the life of the Archæan we know nothing and of that of the Algonkian very little. Many rocks of the latter system were originally of sedimentary origin, but they have been so thoroughly metamorphosed that few traces of their organic contents remain. The remnants discovered are of types similar to those of the succeeding Cambrian fauna, and include worms, linguloid brachiopods, and arthropod remains, some of which are referred to the *Eurypteridæ*. The extensive graphite deposits of the pre-Cambrian rocks are by some authors considered as evidence of original organic deposits.

Those genera and species marked with an asterisk (or italicized) are indicial, that is, characteristic of the formations under which they are mentioned; fossils not so marked may be understood to occur in other periods as well.

Cambrian.—The Cambrian system is represented mostly by littoral and shoal-water deposits containing an abundant fauna, which, while of primitive type, is remarkable on account of its high degree of differentiation. Some of the Cambrian rocks, notably the calcareous shales, in regions of slight metamorphism (New Brunswick, Newfoundland, and Scandinavia) abound in fossils. Elsewhere the sandstones, conglomerates and limestones are poor collecting grounds. This fauna, estimated to contain 1,000 species, comprises representatives of all the seven sub-kingdoms of invertebrate animals, and of 12 out of 30 classes. The entire fauna is marine, and the dominant types were trilobites, inarticulate brachiopods, and hyolithoid shells usually referred to the pteropods. The trilobites form the most interesting elements of the fauna. Compared with those of later times they are more loosely built, and they present many features indicative of primitive types; characters which are seen only in the embryos of later forms. Among the more important are the minute blind Agnostus and *Microdiscus; the spiny *Olenellus, *Mesonacis, *Holmia, characteristic of the lower Cambrian; *Paradoxides, which contains some of the largest known trilobites, indicial of the middle Cambrian; and the flat-shelled *Dikellocephalus of the upper Cambrian. The brachiopods, of which 120 North American species are known, are almost entirely of the inarticulate type, with thin, rounded or spatulate, phosphatic shells, while there were a few members of the articulate group with transverse, calcareous shells. The hyolithoid shells, with triangular elongate form, are abundant. Sponges of the hexactinellid type with net-work of silicious spicules are recognized in Protospongia. The corals are doubtfully represented by *Archæocyathus, and the echinoderms by a few rare cystoids. Among the gastropods there are coiled shells referred doubtfully to Platyceras and Raphistoma in the upper Cambrian, and limpet-like forms, *Scenella, and *Palæacmæa in the middle and upper horizons. The lamellibranchs have a single minute genus *Fordilla, and the cephalopods likewise the minute *Volborthella. Worm trails and burrows are abundant, and various forms of ostracods (*Hipponicharion) are found in the finer grained sediments. Radiolarians and foraminifera have been found, some of the latter (*Orbulina universa*) being indistinguishable from modern species. The only probable plant known is *Oldhamia, referred to the coralline algæ.

The Cambrian fauna in its entirety shows a very advanced stage in the differential evolution of organic types, and there is good reason to believe that long ancestral lines of fossil organisms originally existed in the pre-Cambrian sediments, and further to anticipate that continued search in the less metamorphosed deposits of that remote age will eventually bring to light some of those much sought for initial types.

Ordovician.—The fauna of the Ordovician, or age of graptolites, shows a marked advance in development of all its types over those of the

Cambrian. It also shows a more distinct separation into facies, of which the pelagic, embracing orthoceratite, brachiopod, and trilobite limestones, and the graptolite shale facies are the more prominent. Most of the groups of animals which were initiated in the Cambrian, enjoyed a rapid evolution in the Ordovician time. During that period the trilobites attained their climax in respect of variety and numbers, and were represented by *Asaphus, *Trinucleus, *Remopleurides, *Pterygometopus, and by others that extend up into the Silurian. The Ordovician trilobites present considerable advance over their Cambrian ancestors in respect of increased compactness of structure, perfection of the eye-structure, and elevation of the visual surface above the head, whereby the efficiency of these organs must have been much increased. The cephalopods are represented by numerous orthoceratite genera, with straight or slightly curved shells, some of which were of great size. Orthoceras, *Cameroceras, *Gonioceras, *Piloceras, *Nanno, etc., are associated with closely coiled genera *Trocholites, and other related types that closely resemble nautilus shells.

Among the brachiopods the inarticulate types, so common in the Cambrian fauna, occupy a subordinate place, and are represented by numerous species of Lingula, *Trematis, and *Siphonotreta. The articulate order attained so great an expansion that 325 species of North American Ordovician brachiopods are known. The Polyzoa appear first in the lower Ordovician and are abundant and varied in the upper zones. Gastropods are common, and all have holostomatous shells. Lamellibranchs are common, with several genera of generalized type; corals of various types are common. The hydroid corals (Stromatoporids) formed extensive reefs during Chazy and Trenton time. Echinoderms include abundant cystoids, several crinoids, and rare starfishes and ophiurians. The cystoids are specially abundant in the lower Ordovician, where their fragmentary remains form solid limestone beds of several feet thickness. Sponges allied to Protospongia, and to the modern hexactinellids, are common in a few localities, and in the Trenton limestone of the Mississippi Valley are found the curious digitate *Brachiospongia, the nodulose *Strobilospongia, and the much discussed *Receptaculites. A pelagic facies is recognized in the radiolarian cherts of Great Britain, France, and Germany. The graptolite facies of the Ordovician, by some authors considered to be an abyssal facies, occurs in the form of gray and black bituminous shales and slates, in which numerous genera and species of graptolites are found arranged in definite zones that occupy the same relations to each other in widely separated parts of the world. This great dispersion, and regular succession of genera and species render the graptolites the most important index fossils for the Ordovician, an advantage which is, however, somewhat negatived by the difficulty attending their study. The group began in the upper Cambrian, attained wide distribution and various evolution during the Ordovician, and declined during the Silurian. These graptolite beds are well demarcated from the molluscan and brachiopod limestones and while they occur between the latter at various horizons throughout the general Ordovician and Silurian formation scales of Europe and America, they are best developed in basins where little of the other facies seem to have existed. The faunas of latest Ordovician time are known in only a few regions, since that period was one of comparatively sudden uplift of continental masses, accompanied in many parts of the earth by formation of mountains. But the few late remnant faunas that found shelter in protected basins present a transitional phase between the normal Ordovician and the succeeding Silurian faunas. Late Ordovician time is represented in most parts of North America by a marked hiatus of unconformity indicating wide land areas.

Silurian.—The earliest Silurian fauna of North America, that of the Clinton group, contains a few relicts of the Ordovician fauna lingering on among a host of new species and genera, which were introduced with the return of marine conditions over the interior sea basin. The American rocks and faunas of Silurian time indicate: first, muddy waters of the Clinton epoch, followed by clear seas of Niagara time inhabited by a luxurious fauna, and in which pure organic limestones were deposited. Subsequently the shallow mediterranean Guelph sea of America became dotted with extensive coral reefs, and toward the end of Silurian days the epicontinental seas were again largely drained to form lagoons, tidal mud-flats, and salt lakes of Salina time. Then ensued a short period of wide land-emergence before the early Devonian transgression began. Facies development is well marked and it is worthy of note that the various facies occur in the same relative order and at equivalent horizons in widely separate regions; evidence that the causes which influenced their development in Silurian time acted simultaneously during successive epochs over the entire northern hemisphere. The mollusk-trilobite limestone of Niagara age in North America, is duplicated by that of similar age in England (Wenlock), Sweden (Gotland), and central Europe (Bohemian). The Eurypterus fauna of the Salina group of New York is duplicated by the contemporaneous water-limestones of the English Ludlow, and the Baltic Rotzikŭll beds. The corallic facies of the American Guelph is of the same age and character as that of the English Dudley, Swedish Gotland, and Bohemian dolomites; and finally the Monograptus shales of Great Britain, Bohemia, Brittany, Scandinavia, and New York are all of lowest Siluric age. Another interesting feature of the Siluric fauna is its division into two well-marked types—a northern or Baltic-British-American type, and a southern Bohemian-Mediterranean phase, the species of which are quite distinct. All of the Siluric faunas of North and South America and of Asia are of the northern phase, and the Bohemian-Mediterranean type appears to be merely a local facies. It is of interest that the Silurian fauna of Australia contains representatives of both types.

The chief characteristic of the Silurian fauna is the great evolution of the crinoids, corals, and spire-bearing brachiopods, and Eurypteridæ. Protozoa are rare; sponges and corals attain a remarkable variety and abundance, and in many districts the latter formed extensive reefs. The principal genera are: Favosites, Alveolites, *Halysites, Heliolites, Cystiphyllum, Acervularia, Omphyma, Zaphrentis, Cyathophyllum, *Palæocyclus, and the operculate pyramidal genus *Goniophyllum. The graptolites begin to de-

cline. Cystoids take second rank after the crinoids, whose sudden expansion is expressed in the ratio of about 450 Silurian species to less than 50 from the Ordovician. The brachiopod fauna, while no larger, differs from that of the Ordovician in the increase of the spire-bearing types, and in the remarkable development of inarticulate types with large solid shells. Lamellibranchs offer no important changes, all the genera being still of integripalliate types. Gastropods are numerous. Tentaculites, usually referred to the pteropods, occur by myriads associated with ostracods. The Silurian Cephalopoda comprise straight-shelled Orthoceras, curved Cyrtoceratites, turreted Trochoceras, and coiled Nautilus; also Gomphoceras and Phragmoceras with their restricted apertures, and the aberrant genus Ascoceras.

The Arthropoda are represented by rare barnacles, numerous ostracods, some phyllocarida, rare scorpions, spiders, and insects, as well as by the trilobites and eurypterids. The trilobites show a slight decrease in numbers, but a greater diversity of form over their Ordovician ancestors. The water limestones (of mud-flat origin) of the Salina of New York and equivalent European deposits afford abundant remains of Eurypterus (q.v.), Pterygotus, and *Hughmilleria, some of which grew to be six feet long. These creatures resembled in habits and structure the modern horseshoe crab (Limulus). Rare scorpions, spiders, and insect remains have also been found in these uppermost Silurian lagoon deposits, and they show no very great differences from similar types of the Carboniferous. Their presence indicates the existence of terrestrial life on the extensive continental areas that emerged toward the end of Silurian time. In these highest Silurian rocks, specially in the Ludlow beds of England, Scotland, and Podolia, are found the earliest remains of vertebrate animals in the shape of primitive fish-like creatures of the order Ostracodermi (q.v.).

Devonian.— The Devonian Period was one of constant local physiographic changes, and accordingly its formations and faunas present a greater variety of facies than is seen in any of the older Palæozoic systems. There are two prominent types of the Devonian, each with its distinctive fauna: (1) The marine deposits, of limestones, marls, shales, and sandstones; (2) the continental or terrestrial phase, known as the Old Red sandstone in Europe and as the Catskill shales and sandstones in the eastern United States and Canada. This two-fold aspect of the deposits is more or less prominent in all the geological systems above the Devonian. The Devonian fauna as a whole is distinguished by the development of land vegetation, by rapid evolution of fishes, lamellibranchs, and of goniatite cephalopods, and by the decline of trilobites, and practical extinction of the graptolites and cystoids. Other groups expanded. Hexactinellid sponges (*Dictyospongia), comparable with the modern Venus-flower-basket, flourished in shallow seas, corals are abundant and formed reefs in many regions. The Hydrozoa are represented by numerous reef-building stromatoporas, and by straggling survivors of the graptolites. Among echinoderms, the cystoids are rare; starfish and ophiurians occur commonly at a few localities; and the crinoids are the dominant types of this class, though not so abundant as in the Silurian. The blastoids are represented by Elæacrinus, characteristic of the Onondaga limestone. Worm-trails are common in the shales and sandstones of the middle and upper Devonian. A host of new brachiopods appears, while many Silurian genera run on. The spirifers manifest a marked tendency to develop forked plications and to lengthen the cardinal lines of their shells. Lamellibranchs show a great advance over those of the Silurian, and in certain shale and sandstone formations they outnumber all other types of organisms. Gastropoda of the family Capulidæ are abundant, and minute pteropod shells (Styliolina and Tentaculites) often form solid limestone beds. Among cephalopods a new type of closely coiled shells, Goniatites, with slashed sutures, appears in the lower Devonian, evolves rapidly and reaches its climax before the close of the period. An extinct group of crustaceans, the Phyllocarida, with long strong caudal spines, reach a considerable development, especially in the Hamilton epoch. Eurypterids are rare, though represented by the gigantic Stylonurus in the Catskill beds. The trilobites have many large and bizarre members, as well as a number of small, degenerate forms, during the early and middle Devonian, when they manifested a strong tendency to develop spines along the margin and on the surface of the carapace.

The Devonian is aptly termed the "age of fishes," for within its limits this class enjoyed a great expansion. The lowest Devonian fish fauna is like that of the upper Silurian with numerous Ostracoderms. This is succeeded by a fauna with *Holoptychius, *Pterichthys, Bothriolepis, *Coccosteus, Dinichthys, Dipterus, and a large number of acanthodian sharks, which are indicated by their spines. No remains of any vertebrates higher than fishes are known in the Devonian.

Plant remains in the form of marine algæ are found throughout the Devonian. Some of these, like Nematophyton of gigantic size, were long supposed to be the trunks of coniferous trees. Others with delicately branching fucoid leaves are common, especially in the Hamilton, Portage, and Chemung groups. The continental phase of the Devonian has afforded the earliest examples of land vegetation, all prophetic of the succeeding Carboniferous types. Both the fauna and flora of the upper Devonian show marked affinities by gradual transitions to those of the Subcarboniferous. See PALÆOBOTANY.

Carboniferous.— The early part of the Carboniferous period was marked by a continued recession of the sea, which had begun in late Devonian time, and during the Carboniferous the land areas seem to have reached a greater expansion than they have at the present day. These Carboniferous land masses were of very different form and situation from the present day continents. An Arctic continent occupied the greater part of the Arctic zone and extended by broad peninsulas southward toward the equator, over what are now eastern America, eastern Asia, central Europe, and the eastern Atlantic Ocean. Another, Indo-African continent, covered that part of South America east of the Andes, extended across the south Atlantic, Africa, the Indian Ocean, and Australia. An ocean spread over the present Pacific basin and also over Alaska, all of the United States west

of the Mississippi River, Central America and the western part of South America; while a great mediterranean sea of irregular form encircled the globe and communicated at both ends with the Pacific Ocean. There was also a small Antarctic sea. Toward the close of Carboniferous time the ocean again transgressed and the land masses became for a time somewhat reduced in size. The Carboniferous formations consequently present two well-marked facies: a marine facies with deposits of limestones and shales with mollusks, brachiopods, corals and foraminifera, more widely spread in the lower and upper Carboniferous; and a continental phase of sandstones, shales, and coal-beds, holding abundant plants, and in some localities numerous insects, fish and amphibians. These facies as a rule occupy different basins, but occasionally they are found dovetailed into each other in such manner that their relative ages can easily be determined. The lands of Carboniferous time and especially the coastal swamps supported a dense and rank vegetation comprising more than 1,500 species of plants. Ferns, some of great size, were the most common type. Calamites with fluted many-branched stems and variform foliage, were giant predecessors of our modern horse-tail rushes (Equisetum). Lepidodendron and Sigillaria, related to clubmosses (Lycopodium), with trunks often five feet thick and 75 feet high; Cordaites with sword-shaped yucca-like leaves on a solid trunk 25 to 30 feet high; and other great tree-like plants intermediate in nature between the ferns and cycads, formed the bulk of the forest growth. In the shelter of these forests lived numerous insects, mostly primitive cockroaches, also dragon-flies, one of which (Meganeura) had wings over 20 inches across; primitive forms of locusts, crickets, grasshoppers and also scorpions that were much like those of modern type. On the shores of the swamps lived large amphibious myriopods whose bodies were armed with branching spines. Some land snails like modern Pupa and Zonites have been found. The fresh-water facies also contain remains of lizard-like amphibians (Stegocephalia), many of which have been found in hollow Sigillarian stumps.

The marine phase of the Subcarboniferous contains the first abundant foraminiferan deposits. Minute Endothyra shells form the bulk of the Indiana oolitic limestone; Fusulina, like grains of wheat, and Schwagerina, a globular form, build great limestones in the upper Carboniferous. Corals are not so abundant as in the Devonian and coral reefs are rare. Lithostrotion is the characteristic American genus. The Stromatoporan hydroids are wholly wanting. Crinoids were locally very abundant, especially in the Subcarboniferous beds at Burlington, Keokuk and Crawfordsville in the Mississippi Valley, where about 650 species have been found. The blastoids, with Pentremites as their most abundant type, attained their climax in the Subcarboniferous of America. Among the abundant bryozoa, one genus *Archimedes, with its screw-like axis, is a good index fossil of the Subcarboniferous. The characteristic brachiopods of the Carboniferous are *Productus, Chonetes, *Derbyia, Spiriferina, Marginifera, Meekella, Enteletes. Lamellibranchs are abundant; Gastropoda present a number of heavy-shelled forms; among the Cephalopoda the orthoceratites have greatly declined; nautiloids abound, and the goniatites show great advancement over those of the Devonian, and toward the end of the period transitional types suggestive of the Triassic ammonites appeared.

The arthropod fauna of the Carboniferous is poor in trilobites, eurypterids are common in some coal measure shales, the malacostracan crustaceans show some progress, and the phyllopods Leaia and Estheria are found in fresh-water deposits between coal beds.

The Carboniferous vertebrate fauna is of interest by reason of the sudden expansion of amphibian types in the upper part of the system. The Stegocephalia (labyrinthodonts) are represented by several genera, and consist of generalized types suggestive of the later crocodiles, lizards and snakes. The fish-fauna is abundant, comprising sharks and ganoids. The Waverly shales of Ohio have afforded numerous large lungfishes (Dinichthys) and some fine examples of acanthodian sharks (Cladoselache). Over 600 species of fish have been described from the Subcarboniferous limestones of America.

Permian.— During Permian time the continental conditions were even more prevalent than during the Carboniferous, and accordingly the marine phase is much restricted in distribution and its fauna diminished in numbers. Both plants and animals are transitional between those of the Carboniferous and Triassic. Many types characteristic of the Palæozoic have their last representatives, some of them, it is true, occurring abundantly, in the rocks of this system. Productus, Bellerophon, Orthoceras, Cyrtoceras, goniatites, trilobites and the fenestellid bryozoa, which latter formed extensive reefs in Europe, all become extinct with the close of the Permian. Other types, some of them initiated during the Carboniferous or earlier and continued into the Trias attain a considerable expansion, and give to the fauna a decided Mesozoic aspect. These are found among the lamellibranchs as well as among the ammonoids, fish and amphibians. The Ammonoidea attained a great expansion, and we see together with the simpler goniatite genera the forerunners of the more complex ceratites and Arcestidæ of the Trias, and also the eminently characteristic genus *Medlicottia. The fish fauna of the Permian consists mainly of heterocercal ganoids. Acanthodian sharks reached the climax of their evolution. The stegocephalian amphibians, among which *Branchiosaurus and *Archegosaurus are the best known, were varied and common, and were the dominant types of life. There were also snake-like members of this group, one of which, Palæosiren, was nearly 45 feet long. A new type of vertebrate appears in reptiles of land and fresh-water habits. Rhynchocephalians are represented by lizard-like *Palæohatteria, and the peculiar spiny *Naosaurus, and *Dimetrodon.

While the Permian flora is in general the same as that of the Carboniferous it contains some types not seen in the latter — broad-leaved ferns, Glossopteris; the conifers Walchia and Voltzia, and the cycad Zamites, which give to the flora a strong Mesozoic expression.

Mesozoic.— The Mesozoic fauna and flora are distinguished from those of the Palæozoic by the absence of trilobites, graptolites, orthoceratites, long-hinged brachiopods, tetracorallic and tabu-

late corals, cystoids, palæocrinoids, blastoids, phyllocarid crustaceans, eurypterids, palæoconch lamellibranchs, goniatites, acanthodian sharks and placoderm fishes, and the great lycopods. On the other hand this era is marked by the introduction of numerous new types and by the expansion of many invertebrate groups, land and marine reptiles, multituberculate mammals, and cycads and conifers. During the era a great change in the expression of the life is apparent, in that the early Triassic life presents close analogies with that of the late Permian, while during the era an almost complete change takes place, and that of the upper Mesozoic, especially the vegetation, affords considerable resemblance to the early Tertiary. The wide extension of continental areas continued from Permian into Triassic time with perhaps a slight increase, and in North America marine Triassic fossils have been found in only a few places in the far West. The fauna as a whole is an impoverished one. The continental Trias, consisting of red beds in America, Europe and Asia, contains abundant remains of ganoid fish (*Semionotus) together with some cycads and conifers. In some regions these beds have afforded also numerous remains of often gigantic stegocephalian Amphibia, which attained their climax during this period. Small amphibious precursors of the large marine Jurassic ichthyosaurs and plesiosaurs are found in *Lariosaurus, *Nothosaurus and others. The Theromorpha, reptiles exhibiting remarkable affinities with the carnivorous mammals, attained a great development in South Africa. The first turtles, crocodiles, and dinosaurs occur here. The earliest mammalian remains consist of fragmentary jaws and multituberculate teeth of small animals supposed to be allied to the modern monotremes: Microlestes, Triglyphus in Europe, and Dromatherium and Microconodon in North America.

The marine Trias is found well developed in the Alps with extensions into Asia Minor, India, Arctic regions, Pacific States and Australia. The number of species is comparatively small, though individuals are abundant. Foraminifera and calcareous sponges abound. Corals of perforate and aporose genera formed extensive reefs in some regions. Crinoids are represented by the eminently characteristic *_Encrinus liliiformis_, and echinoids by the regular sea-urchin Cidaris. Among the brachiopods are a few remnants of Palæozoic genera, while the families Terebratulidæ, Rhynchonellidæ, and Koninckinidæ are surprisingly developed. The lamellibranchs begin to show considerable expansion, and the first true fresh-water unios appear here. The marine gastropod fauna is abundant, with some old types and others of later Cretaceous and Tertiary aspect. The ammonites, which began in the Permian, show a wide differentiation of form and complexity, and attain the culmination of their evolution in the upper Trias. Over 1,000 species have been described. Ostracods are abundant, and a true macruran decapod, Pemphix of the Muschelkalk, reminds one of the modern crayfish.

Jurassic.— The facies development of this system is very varied; the continental phase predominates in America as the Newark or Connecticut River sandstones, while the marine phase is most prominent in Europe and Asia. The Jurassic flora is quite similar to that of the Trias, made up of cycads and conifers which are forerunners of the recent pines. Among marine invertebrates the sponges and corals, largely of modern type, were so abundant as to form great reefs. Crinoids were abundant in individuals, though genera and species were few; echinoderms and Bryozoa were common, while the brachiopods were restricted to a few families. The lamellibranchs and gastropods include the first representatives of a number of modern families. The ammonites are by far the most abundant and characteristic forms of mollusks, and by means of them the marine Jurassic of Europe has been subdivided into some 15 zones, each characterized by its particular species. Belemnites, the solid cigar-shaped internal shell of squid-like dibranchiate cephalopods, are very abundant and varied, and the fossilized ink-bags of these creatures are common in some formations. The crustacean fauna shows a great increase of long-tailed decapods allied to prawns, shrimps, and crayfish, and the earliest true crabs. Insects include dragon-flies, May-flies, termites, grasshoppers, crickets, walkingsticks, and some beetles; also occasional bugs, flies and ants. The ganoids with heterocercal tails take a subordinate role, while those with homocercal tails and scaly rhombic plates predominate. Sharks and rays and the first teleost fishes complete the Jurassic fish fauna.

The reptiles form the most interesting group of the Jurassic fauna, for during this period they reached the highest stage of their evolution both in variety and abundance. The Triassic stegocephalians and Theromorpha give place to the terrestrial dinosaurs and the marine ichthyosaurs and plesiosaurs. The latter held somewhat the same relation to reptiles that the whales of modern time hold to the mammals. Those sea lizards swarmed in the Jurassic seas where they preyed upon the fish. The dinosaurs held sway upon the land, not only during the Jurassic Period, but also during the greater part of the succeeding Cretaceous. Another type of reptile prominent during Jurassic time, and continued into the Cretaceous, was the group Pterosauria or flying lizards, of which the pterodactyl is the best known example. Other types of reptiles, as turtles and crocodiles, are more or less common. At the same time when the reptilian stock developed flying creatures there appeared the earliest known bird. (See ARCHÆOPTERYX.) The mammalian remains of Jurassic time are known only by isolated teeth and jaws of small size and very rare, and all are related to the marsupials and monotremes.

Cretaceous.— The flora of the lower Cretaceous is like that of the Jurassic, but gradually the cycads diminish in importance and a host of angiosperms appear, very similar to the trees and shrubs of to-day. Many genera of recent tropical and temperate zone plants occur in the Cretaceous rocks of Greenland and northern Europe, facts cited as evidence of the mild climate of those parts during Cretaceous time. The ammonites begin to decline and we see numerous degenerate types, last members of various races, with shells loosely coiled, turreted, hook-like, or even straight, many of which are characteristic index fossils. The group becomes entirely extinct with the close of the Cretaceous.

The close of Cretaceous time terminated the middle or Mesozoic period of the history of organic life, and marked the extinction of a number of types of animals which had for long

epochs dominated the lands and seas. This extinction is perhaps more evident here than at the end of the Palæozoic, and its causes are wholly unknown. It is true that some groups (Ammonites) had already begun to show marked degenerate tendencies attendant upon race senility, but the majority of the groups became extinct at the height of their evolution, when they were represented by their most highly specialized types. It is possible that this very specialization rendered them more liable to injury by slight though abrupt climatic changes or by sudden variations in the depth of the seas in which they lived. The great land and marine reptiles, the flying lizards, the mesosaurs and toothed birds all became extinct. Likewise the ammonites, belemnites, rudistæ, and the pharetrone sponges, so characteristic of the Mesozoic, have not been found above the upper limits of that system.

Cenozoic.— The life of this era is like that of recent time, particularly the marine life, for the terrestrial mammalian life of a large part of the system is very dissimilar to modern animals. The early classification of this system was based upon the increasing percentage of still living species found of both plants and animals fossil in the deposits. (See PALÆOBOTANY.) Some of the distinctive types of invertebrates were of larger size than usual. Sponges and corals are abundant only in restricted localities. Foraminifera, Radiolaria, echinoderms, Bryozoa, lamellibranchs, and gastropods are present in great variety while crinoids, brachiopods and cephalopods are comparative rarities. The preponderance of crabs, with a number of extinct genera, over the long-tailed, lobster-like decapods is very marked. Acorn barnacles, often of large size, are common, and fresh-water snails and mussels, all of modern types, are abundant in the fresh-water deposits of both Europe and America. Insects of all kinds have been found in the Oligocene and Miocene deposits, especially at Florissant and White River, Colo., and in the amber of the Baltic provinces, which latter has furnished about 2,000 species.

But the greatest interest attaches to the vertebrate fauna of the Tertiary, for during the early days of this period the placental mammals outstripped the marsupials and monotremes, and became the lords of the land, and toward the end of the period appeared man. The reptiles, which held so prominent a place during the Mesozoic, are reduced to the true lizards, snakes, crocodiles, and turtles. The amphibia which, as Stegocephalia, had become almost extinct during the middle Mesozoic were resurrected in the Eocene as salamanders, toads, and frogs, and continued thence till the present day. The fishes included numerous large sharks and a preponderance of bony fishes of which many belonged to modern genera, such as perch, herring, carp, pike, catfish, eels, breams, and mackerel. Birds exhibit a continuously expanding evolution during the Tertiary and they are still expanding. See MAMMALIA; TERTIARY PERIOD.

Conclusion.— The dominant types of the consecutive periods present on the whole an increasing degree of perfection of structure, and the dominant types of one age are, as a rule, not related to the dominant types of the preceding age. These dominants are usually the most highly specialized members of the classes or orders to which they belong, and it is further to be noted that dominance and high specialization have in most cases been soon followed by decline and extinction. The small primitive forms of one period may evolve into the large dominant types of the next epoch and in their turn decline and disappear. In the invertebrates and lower vertebrates (fish, amphibia, and reptiles) the rate of this evolution, and consequently the destiny of the race, is almost wholly dependent upon the presence and continuance of favorable conditions of existence, for these types have little or no ability to surmount physical difficulties. Among the higher vertebrates, enlargement of the brain mass and of the mental faculties enables the animals to circumvent unfavorable conditions to some extent, but they also are comparatively helpless. It is in man, with his highly developed intellect, and mechanical skill, that we see the only organism able not only to circumvent unfavorable conditions of life but actually to nullify them, and to practically subjugate all other organisms or render them useful to him in his affairs. We have said that high specialization indicates approaching decline and extinction. That is true in respect of structural evolution, but as regards intellectual evolution, and the directions in which it may differentiate, we know next to nothing beyond the fact that intellectuality has up to the present time evolved with remarkable acceleration. In view of this it seems impossible to conceive otherwise than that man, under strong physical, moral and religious control, can have before him any other than a future longer and more brilliant than his comparatively brief existence.

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Palæozoic, Paleozoic, the third great division of Geologic time and the first one in the sediments of which well preserved organic remains have so far been found. It is preceded by the Proterozoic or Eozoic (first life or dawn of life) and by the Azoic (no life) divisions in descending order, and succeeded by the Mesozoic (Mediæval life) the Cenozoic (recent life) and the Psychozoic (mind life) time divisions, in ascending order. The name signifies ancient life and has reference to the character of the plant and animal life of the time, which was markedly unlike that of the present. As a time division, the Palæozoic is generally called an Era, this term meeting with the recommendation of the International Geological Congress at its Bologna convention in 1881. Dana in his 'Manual of Geology' (5th edition) however uses the expression "Palæozoic Æon or Palæozoic Time," and applies era to the next smaller subdivision. In this he has been followed by several authors. Though in its modern sense primarily used for a time division, the term Palæozoic is also applied to that division of the earth's crust which was formed during that time. And indeed this is the original use of the term, when it was coined for the reception of the fossiliferous rocks below the so-called Secondary or Mesozoic formation. The rocks thus named were formerly included with the crystalline rocks of all ages as "Primary," but later on they were separated at least in part, as "Transition rocks." Lyell, to avoid confusion, spoke of them as the "Primary fossiliferous rocks." The following parallel columns express perhaps as nearly as possible the correlation between the older and newer terms.

OLDER	NEWER
Quaternary	Psychozoic
Tertiary	Cenozoic or Cainozoic
Secondary	Mesozoic
Transition (or Primary fossiliferous)	Palæozoic
Primary	Eozoic (or Proterozoic)
	Azoic

In the formation scale the term "group" was recommended by the International Congress as coordinate in rank with that of Era in the time scale. This recommendation has not been very generally adopted in America, where the term group is commonly used for a smaller formation and "series" used for such rock divisions as that corresponding to the Palæozoic æon.

The following subdivisions of the Palæozoic are recognized:

Permic (or Permian) era and system.
Carbonic (Carboniferous or Carbonian) era and system.
Devonic (Devonian) era and system.
Siluric (Silurian, Upper Silurian) era and system.
Ordovicic (Ordovician, Lower Silurian or Champlainic) era and system.
Cambric (Cambrian) era and system.

Characteristic Life of the Palæozoic.— The characteristics of Palæozoic life were very marked and stamp the æon as boldly contrasted with the succeeding Mesozoic. The Hydrozoa were represented by the group of Graptolites, and by *Dictyonema*, both of which are wholly confined to the Palæozoic. Among corals the group of rugose corals, or Tetracorolla (so-called from having four primary radiating lamellæ or septa with reference to which the others are arranged), the honey-comb corals, *Favosites*, and the tube corals, *Aulopora, Syringopora, Halysites*, etc., are characteristic types practically unknown in post-Palæozoic time. Among the Pelmatozoa or stemmed Echinoderms, the two groups of Cystids and Blastids are wholly confined to the Palæozoic, while the Crinoids with the exception of the family Articulata, and the genera *Marsupites* and *Uintacrinus* are likewise restricted to the Palæozoic. Asterozoa, or star-fish and brittle stars, and Echinozoa or sea-urchins and holothurians, while represented in Palæozoic rocks, especially the Echini, are more characteristically known from Mesozoic and later strata. The Bryozoa are well represented by such types as *Ceramopora* and *Fistulipora* and their congeners among the Cyclostomatous Bryozoa; by the Monticuliporoids and related types constituting the suborder Trepostomata of Ulrich; and by the Fenestelloids and related types constituting the suborder Cryptostomata of Vine. These often constructed extensive reefs, and in the Ordovicic especially, gave rise to extensive limestone deposits.

Brachiopods are perhaps the most important Palæozoic types, no less than 2,600 species having been described from the Ordovicic and Siluric deposits alone. Several archaic families, that is, the Lingulidæ, the Discinidæ and the Craniidæ, and the family of the Rhynchonellidæ, range from the Ordovicic to the present time while modern types such as some of the Terebratuloid families and the family Thecidiidæ among the Strophomenoid shells begin in the middle or late Palæozoic. By far the largest number, however, end with the Permic or before, while a few others run on into the Trias. The Spirifer family, so characteristic of the Palæozoic horizons, is represented in both Triassic and Jurassic beds by a few genera.

Leaving out of consideration the persistent archaic families before mentioned, the post-Palæozoic brachipods belong chiefly to the Rhynchonelloid and Terebratuloid families of the most specialized order of Brachipods, the

Telotremata. The only prominent exception is the modern family of Thecidiidæ of the Protremata, which makes its appearance in the Carbonic rocks.

Turning to the Pelecypods or bivalve mollusks, we find that their principal representatives belong to post-Palæozoic time. The primitive order of Prionodesmacea, represented by such modern types as the oyster and scallop (Pecten), alone has a prominent representation in the Palæozoic, where about thirty families are found. Of these more than one half continued to exist beyond Palæozoic time, with few exceptions indeed down to the present time. Only thirteen out of forty families of this order (as now understood) are confined to the Palæozoic. On the other hand post-Palæozoic time is characterized by about eighty-six families. The gastropoda are likewise essentially post-Palæozoic Mollusca, those of Palæozoic time being essentially primitive or archaic in character. Among the most typical Palæozoic forms are the Pleurotomariidæ, Bellerophontidæ, Euomphalidæ, Trochonematidæ and the Platyceroids. The group of the Conularida with Hyolithes, Tentaculites and Conularia, are also typically Palæozoic, only a few representatives of the latter continuing into the Lias.

The tetrabranchiate cephalopods were well represented during the Palæozoic by the Nautiloidea. Of forty families belonging to this class, only three originated in post-Palæozoic time, and only one of these, the family of the true Nautilus, continued to the present time. Of the thirty-seven Palæozoic families three have representative genera in the Trias and one is represented by a single lower Jurassic genus. The straight-coned nautiloids (orthoceracones), the bent cones (cyrtoceracones), and the loose-coiled cones (gyroceracones) are practically confined to the Palæozoic rocks, the close-coiled nautilicones alone characterizing later horizons as well. The ammonoids on the other hand are represented in Palæozoic rocks only by their more primitive types. The Goniatitoids and Climenioids belong exclusively to the Palæozoic (Devonic to Permic), while the other groups are only represented by the order Phyllocampyli.

Among crustacea, the Trilobites are wholly confined to the Palæozoic rocks, of which they constitute in many respects the most characteristic type of fossil. Their greatest development was during Cambric and Ordovicic time. The remarkable order of Eurypterid crustaceans is also confined to the Palæozoic, constituting the most characteristic type of certain formations. The only other type of crustaceans abundantly represented in the Palæozoic rocks is that of the small bivalve ostracods.

Palæophysiography of North America.— The physiographic changes which the North American continent suffered during Palæozoic time may be summarized as follows: In early Cambric time the greater part of the interior of North America was out of water, the eastern shore being probably a short distance east of the present Appalachians, and the western shore on the western flanks of the rocky mountains. The southern shore was not far north of the present southern boundary of the United States. A narrow gulf extended northward along the western flank of the Appalachian protaxis, and probably connected with a similar gulf extending southward from the present Saint Lawrence gulf. The fauna of this Appalachian trough was mostly distinct from that of the Atlantic border. In the succeeding periods there was a continuous subsidence of the land, and a transgression of the shore-line, which closed in upon it, especially from the southwest. As the sea in each succeeding epoch reached farther up onto the land than it did before, the deposits of later date lapped over the earlier ones. This encroachment continued with many interruptions through the early part of Ordovicic time, when the great Appalachian Valley, bounded by two parallel folds, came into existence. This separated the interior or Mississippian sea from the Atlantic, until, with the final emergence of the land, this sea was transferred to the Great Plains region of the west.

Coincident with the formation of these folds, the interior sea retreated southwestward, only to readvance again during middle Ordovicic time, when it reached far up onto the old Canadian land. Though generally distinct from the Atlantic, periodic communications were established across the barriers, allowing the ingress into the eastern area, of the European graptolite and trilobite faunas, in middle Trenton and in Utica time. At the close of Ordovicic time, the Taconic revolution caused the formation of an effectual eastern barrier, and at the same time the waters of the interior sea were largely withdrawn. A gradual resubmergence in Siluric times, re-established the Mississippian sea. In mid-Siluric time it was probably entirely enclosed by land, only the region between the Appalachians and the Mississippi River being covered by water. This water body extended northwestward over what is now Hudson Bay and the arctic regions beyond. It probably communicated with the European continent by a channel traversing the north polar regions, the north Atlantic being then replaced by a continuous land area which connected New England with Scandinavia by way of Labrador and Greenland. This northern channel was later on closed for a period, so that all that portion covering the eastern United States became a saline sea in which life became extinct. In this North American dead sea, the great Siluric salt and gypsum beds of New York, Ohio and Michigan were deposited. At the close of the Siluric the whole of the North American continent became dry land, and the Mississippian sea was reduced to a narrow channel along its former eastern border. In this channel the Helderbergian rocks of the New York and the Appalachian region were deposited. Toward mid-Devonic time this sea spread westward again to Michigan and southward to Indiana, and the great Palæozoic coral reefs began to flourish, The westward transgression of the Mississippian sea continued, until finally a northwest channel was established, by which the Eurasian faunas could enter across what is now northwestern Canada. Many fluctuations and adjustments took place, the eastern border of the sea growing shallower, and the western deeper. In early Carbonic time, the sands deposited in the eastern part of this Mediterranean sea permitted the existence of only a sparse fauna, while in the region now known as the Mississippi Valley, great reefs of crinoids flourished. In mid-Carbonic time, the interior sea extended to the foot of the Rocky Mountains, while the greater part of the region east of the present Mississippi

River was converted into the fresh water morasses, in which the extensive coal beds of eastern North America were deposited. This condition continued with slight changes through Permic time, and was terminated by the great physiographic changes which accompanied the formation of the Appalachian Mountains. This resulted in the permanent elevation of the North American continent. Marine deposits of the early Mesozoic are known only in the northwest. Later in Cretacic time, the Great Plains region and the Atlantic border were resubmerged, but eastern North America remained continuously above water, with the exception of a slight submergence in the Hudson and Champlain valleys in late Pleistocene time.

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Palæs'tra (Greek, "wrestling-school"), originally a school for the training of Greek youth in gymnastic exercises. At first private, such schools were afterward supported by the state, and in the most comprehensive sense a palæstra was a public place set apart, and under official direction, for exercises in wrestling and various forms of athletics. In these schools or gymnasiums special privileges were given to athletes training for contests in the public games. The name palæstra is also applied to wrestling and athletics themselves.

Palafox y Melzi, DON **José de,** dŏn hō-sā' dā pä-lä-foh' ē māl'thē, DUKE OF SARAGOSSA, Spanish patriot: b. Aragon 1780; d. Paris, France, 16 Feb. 1847. When very young he was appointed an officer of the royal bodyguard and in that capacity accompanied Ferdinand VII. to Bayonne in 1808. Palafox escaped the capture which befell his royal master and fled to Saragossa which he defended in two sieges in 1808–9, but was captured by the French and imprisoned (1809–13) at Vincennes. He then returned with the king to Spain, and was confirmed as captain of Aragon. Later he turned against Ferdinand VII. and in 1833 joined the forces of Queen Isabella. He was created Duke of Saragossa in 1836.

Palaihnihan, pa-līh'nĭ-hăn, or **Pit River Indians,** an American family comprising numerous tribes living in the northeastern part of California, in the basin of the Pit River, hence the local or common name of Pit River Indians. Seven distinct tribes of these people were known in the days of 1849, but they are now almost extinct. They are of a low type of the American aborigines.

Palais Royal, Fr. pä-lā rwä-yäl, a collection of buildings in the Rue Richelieu in Paris, composed of a palace, public gardens, shops, cafés, and restaurants. The palace was built in 1634. (See PARIS.) Here Napoleon installed the Tribunate. At the restoration it was repurchased by the Duke of Orleans. He formed the Cours de Nemours, and built the Gallerie d'Orléans. At the revolution of 1848 the Palais Royal was appropriated as the domain of the state, and called the Palais National. On 23 May 1871, during the struggle between the army of Versailles and the Communists it was set on fire. The left wing and part of the central pavilion were destroyed, but the galleries and the Théâtre Français were preserved. The destroyed wing has been rebuilt, and other portions of the palace have also been restored. The Théâtre Français and the Théâtre du Palais Royal form part of the buildings.

Palamedes, păl-ạ-mē'dēz, in Greek mythology, a hero, the son of Nauplius and Clymene. Although figuring prominently in the later accounts of the Trojan war, he is not referred to in the Homeric writings. Having discovered that the madness of Odysseus was only feigned, and having brought him to the leaders before Troy, Palamedes is said to have become an object of hate to that hero, and to the vengeance of Odysseus, according to some of the varying stories, the death of Palamedes was due. He is represented as skilled in learning, and his name is connected with the invention of letters, numbers, money, weights and measures, checkers, and dice.

Palanan, pä-lä'nän, Philippines, a pueblo of the province of Isabela, Luzon, on a river, five miles from the Pacific coast, at the foot of the Sierra Madre Mountains, 36 miles east of Ilagan. A mountain trail begins at this point, and Palanan is the trade centre for the surrounding region. It was here that Aguinaldo was located and captured. Pop. 1,140.

Palanpur, pä-lạn-poor', **Pahlanpur,** or **Pahlumpur,** native state of India in the province of Gujarat, Bombay division, south of Rajputana. The state is crossed by the Rajputana-Malwa railway, on which the town of Palanpur, capital of the district, is, a junction for the British cantonment of Deesa. The native state has an area of 3,177 square miles and population (1901) of 222,627. A political agency including this and other surrounding states contains 4,775 square miles and has a population of 467,691. The town, with a population (1901) of 17,799, like the state and the agency, suffered terribly from plague, so that the population is one quarter less than 10 years ago.

Palanquin, păl-ạn-kēn', **Palankeen,** or **Palki,** a vehicle commonly used in India and Oriental countries. It is a sort of litter or covered carriage, borne on the shoulders of four porters, eight of whom are attached to it, and who relieve each other. It is usually provided with a bed and cushions, and a curtain, which can be dropped when the occupant is disposed to sleep.

Palate, the roof and the superior aspect of the mouth or oral cavity toward its hinder or posterior portions. Anatomists are accustomed to speak of the hard and the soft palate. The former is constituted by the palate and superior maxillary bones; the latter is the more or less mobile prolongation of the hinder part of the roof or lining membrane of the mouth which is attached to the posterior border of the hard palate. The hard palate supports the tongue when that organ is employed in tasting, in the production of articulate sounds, in mastication, and in swallowing. The membranes and tissues which cover the bones forming the hard palate are of thick conformation, and are closely bound to the surface of the bones. The tissues are thinner toward the middle line of the palate. The palatine glands exist in a row on each side of the hard palate, and are most numerous and of larger size as the hard palate is continued backward to form the soft palate. The mucous

membrane of the hard palate is of a whitish color, this appearance being produced by a thick layer of epithelial cells covering the membrane.

The soft palate exists only in the crocodiles out of the class *Mammalia.* In the *Cetacea* it forms a muscular canal, which prolongs the hinder nostrils downward and backward, and is thus adapted to the breathing-process of these aquatic forms. In the ant-eaters the soft palate is nearly eight inches in length. It consists in all of mucous membrane and muscles, and forms a semi-partition between the mouth and the hinder nostrils. In front it is attached to the hard palate. Behind it is free, and in the middle a pointed process, the uvula, is situated. Its upper surface, or that next the nasal passages, is convex, and is prolonged to form the floor of the nose. The lower or under surface is concave, so as to adapt it to receive the back of the tongue; and on this surface the soft palate bears a median ridge, showing the early stage of its formation, when it consists of two halves. Non-union of these halves and of those of the hard palate produce the deformity known as cleft palate. Mucous glands are abundantly distributed in the membrane forming the soft palate, these structures secreting the mucus which serves to lubricate the throat during the passage of food. Above these glands muscular tissue is found, and the upper surface is formed of mucous membrane of the nasal passages already alluded to. The uvula, depending in the middle of the soft palate, gives to the latter the appearance of a divided or double arch. This structure, the uses of which are undetermined, consists of numerous mucous glands, and a muscle known as the azygos uvulæ. The uvula varies in length in different subjects and at different times in the same person. Its permanent elongation gives rise to an irritant cough produced by its tickling the throat, and for the relief of this complaint its lower border is frequently excised.

In front the soft palate becomes continuous with the tongue and pharynx or back part of the mouth through two mucous and muscular folds on either side known as the anterior and posterior pillars of the fauces. The anterior arch of each side exists as a curve from the uvula to the side of the tongue. The posterior arch begins at the uvula, follows the free edge of the soft palate, and ends at the side of the pharynx. The pillars of each side separate or diverge in a triangular manner from their point of origin, and within the triangle of each side a tonsil is contained.

The muscles of the soft palate number five pairs. These are the levatores palati, which raise the soft palate and bring it to the horizontal position in swallowing. The tensores palati draw the soft palate downward and tighten it, and their action also includes the keeping patent and open of the Eustachian tube. The palato-glossi and palato-pharyngei muscles form the bulk of the arches of the soft palate; and the azygos uvulæ muscle constitutes the last structure of this description included in the soft palate. The tonsils or amygdalæ ("almond-like") are placed between the palatine arches. The substance of each tonsil contains numerous follicles, which open externally by 12 or 15 openings, and more deeply placed are masses of adenoid or lymphatic tissue similar to the Peyer's patches (q.v.) of the intestine. The tonsils are liable to inflammatory affections, and are excised for disease without leaving any bad effects. (See TONSILLITIS.) Both the hard and soft palate are supplied with blood by the descending palatine branch of the internal maxillary artery, and with nerves by the palatine branches of the superior maxillary nerve. The use of the soft palate is chiefly to close the posterior nares or nostrils, and so to prevent the escape of the food by the nose in swallowing; during which process the palate is elevated by the levator muscles from its usually dependent position to the horizontal position. In the latter position it lies upon the back of the pharynx, and so closes the nares. The arches of the palate assist in swallowing. The anterior arches during deglutition contract, so as to prevent the food from returning into the mouth; while the posterior arches contract at the sides, and so preclude the escape of food into the nose. The whole process of swallowing is performed firstly by the mass of food being brought to the back of the tongue. The lower jaw being next closed to afford a fixed point for the action of the muscles which raise the larynx, the food is sent into the elevated pharynx by the pressure of the tongue on the palate. The posterior palatine arches and soft palate prevent the escape of the food into the nose at this stage; the anterior palatine arches and tongue prevent it returning to the mouth; the epiglottis is shut over the upper opening of the larynx so as to prevent the food entering the windpipe; and by the action of the constrictor muscles of the pharynx the food is finally shot into the œsophagus or gullet, along which tube it is propelled to the stomach by the peristaltic or vermicular contraction of its muscular walls. See MOUTH; NOSE AND THROAT; PHARYNX; TONGUE.

Palat'inate, The, (1) a comprehensive term for two states of the German Empire, which, until 1620, were united. The name Palatinate (German, *Pfalz*) was originally given to the imperial castles dispersed over the German Empire, in which the emperors resided alternately, with a view to maintain order by their presence, and to administer justice impartially in all the provinces of the empire. The palatine or count palatine was the highest civil and judicial officer in these castles. Finally, the title was retained by only two of the territorial magnates of the empire, whose states were distinguished as the Upper and Lower Palatinate, or as the Palatinates of Bavaria and the Rhine. The Upper Palatinate was included in the circle of Bavaria, and was bounded north by the county of Baireuth, east by Bohemia, south by the county of Neuburg, west by Bavaria and the territory of Nuremberg. Its capital was Amberg. The Lower Palatinate (Palatinate of the Rhine) was contained in the electoral circle of the Rhine, and was situated on both sides of the river. It was bounded by the territories of Mainz, Katzenellenbogen, Würtemberg, Baden, Alsace, Lorraine, and Trèves. It was composed of the Palatinate proper or Electoral Palatinate on the right bank of the Rhine, one of the most fertile countries in Europe, and of the Principality of Simmern, the Duchy of Deux-Ponts (Zweibrücken), the half of the county of Spannheim, and the principalities of Veldenz and Lautern. The counts-palatine of the Rhine,

whose original seat was Aix-la-Chapelle, in the 11th century were already in possession of the office, and of the lands pertaining to it, and were among the most powerful princes of the German Empire. In 1227 the entire Palatinate fell into the possession of the house of Bavaria and underwent a series of successions until 1619 when Frederick V., of the Simmern line, who had succeeded in 1610, was put to the ban of the empire for aspiring to the crown of Bohemia. (See GERMANY; THIRTY YEARS' WAR.) His Electorate and estates were given in 1623 to Maximilian, duke of Bavaria. Charles Louis, son of Frederick V., recovered the Lower Palatinate by the Peace of Westphalia (1648), and a new electorate, the eighth, was created for him, with the office of high-treasurer. The Upper Palatinate and the former rank of the elector-palatine in the electoral college remained with Bavaria. In 1742 the electorate fell to the Sulzbach line, represented by Karl Theodor, and in 1777 he succeeded to the Electorate of Bavaria, a portion of the estates of which, however, fell to Austria. This was accompanied by the recovery of the old electoral office of the Palatinate, and the transference of the grand-treasurership to Brunswick. Toward the close of his reign the Palatinate was conquered by the French. He died without issue in 1799, and was succeeded by Maximilian Joseph, duke of Zweibrücken. At the Peace of Lunéville (1801) he was compelled to surrender the Palatinate. The possessions on the left bank of the Rhine were annexed to France, a considerable part of the remainder was given to the Grand-duke of Baden, and the rest was distributed among other princes. At the Peace of 1814 Germany recovered her possessions on the left bank of the Rhine, and the Palatinate was redistributed among Bavaria, Baden, Hesse-Darmstadt, and Prussia. The portion belonging to Baden is included in the circles of Mannheim, Heidelberg, and Mosbach; the Darmstadt portion constitutes the provinces of Starkenburg and Rheinhessen. Bavaria received the whole of the Upper Palatinate and the portion of the Lower Palatinate, forming the Bavarian circle of Rheinpfalz. The Prussian portion was added to the Prussian province of Rheinland.

(2) The term palatinate or county palatine came into use in England during the 13th century, the counts or earls-palatine ruling over entire counties, acting as independent princes, exacting feudal rights and contributions, and simply swearing homage and fealty to the king. The principal counties palatine were Lancaster, Chester, and Durham. In the colonial days of the United States Maryland was granted to the Baltimore family as a county palatine on the model of Durham.

Pal'atine Hill (Lat. *Palatium*, later *Mons Palatinus*), the most central, the earliest settled, and (save for the Capitoline) the most famous and important of the seven hills of Rome. About 150 feet above the Tiber and 15 more above the sea-level the hill is an irregular quadrilateral, and to this shape is due the mythical *Roma quadrata*, the primitive city built by Romulus. The name Palatium, which the Romans connected with the Arcadian city Pallantium, is probably related with Pales, an Italian rural divinity. On the Palatine the Lupercalia was celebrated in honor of Romulus; there were the ancient temples (of Victory, Jupiter Stator, and the Magna Mater) in the days of the early republic, the residences of Cicero, Marcus Scaurus, and others in the last period of the republic, and at the beginning of the principate Augustus' own home (to which fact the use of the word "palace" from *Palatium* is due), the temple of Apollo dedicated in 28 B.C., and the Latin and Greek library. Tiberius and Caligula built additions to Augustus' palace; the latter emperor bridged the Capitoline to the Palatine. The Palatine was no longer used as an imperial residence after the time of Alexander Severus, and there was no more splendid building there until Pope Paul III. built the villa called Orti Farnesiani. Excavations of the hill began in 1762 under Bianchi's superintendence, and was renewed a century later by Rosa at the expense of Napoleon III. The Italian government purchased the Farnese Gardens in 1871, and now has charge of excavations.

Palatka, pa-lăt'ka, Florida, city, county-seat of Putnam County; on the St. John's River; and on the Florida E. C., the Florida Southern, the Georgia S. & F., and the Jacksonville, F. & K. W. R.R.'s; 47 miles in direct line south of Jacksonville. It is the centre of a prosperous agricultural and fruit region, is in daily steamer communication with Jacksonville, and exports large quantities of oranges, sugar, and cotton. It is also popular as a winter resort. It is the seat of the Putnam County High School, and of the St. Joseph's Academy and Day School (R. C.). Pop. (1890) 3,039; (1900) 3,301.

Palawan, pä-lä'wän, Philippines, the most southwestern island of the archipelago, lying west of Mindoro, Panay, and Negros; it is bounded on the west by the China Sea, which it separates from the Sulu or Mindoro seas; area 4,368 square miles, with dependent islands 4,726 square miles. It is one of the largest islands of the Philippines, and from its geographical position one of the most important, as it lies in the trade route between India and China and Manila.

Topography and Climate.—The island is long and narrow in shape; the greatest length from northeast to southwest is 278 miles, and the width averages only 17 miles, and is nowhere more than 30 miles. The coast is indented with numerous sounds, gulfs, and bays, most important among them Malampaya Sound (q.v.). A mountain system which divides Palawan into two watersheds, extends the length of the island following the general direction of the coast; the highest summit of this system is Mantaliñgahan in the south (6,843 feet); the average height is from 2,500 to 3,000 feet; between the summits are high table-lands. There are a number of rivers, which are all short; in the northern part there is a lake which opens into the ocean by a subterranean river. The climatology of the island shows two seasons, the southwest monsoon or wet season and the northeast monsoon or dry season; the heat is not extreme; malarial fevers are common on some parts of the coast.

Forests and Fauna.—The mountains are very heavily wooded, the forests contain valuable building, dye, and medicinal woods, including ebony, sandal, logwood, bamboo, ipil (a very hard wood), apiay, camphor, gum mastic, mo-

lave; a number of the trees found in Palawan exist nowhere else in the Philippines. Dammar, a gum which exudes from a large tree, is found in many places in deposits in the earth, which have, however, never been fully worked. The nipa palm grows luxuriantly along the rivers, and rattan is an important article of export. There are also numerous plants of varied character, including orchids and pitcher plants; among the latter is a trailing variety, the pitchers of which will hold a pint and a half of water.

The wild animals of Palawan are not very numerous; there are several varieties of the monkeys, also the pakdá or big ape, and porcupines; the birds are mostly of unusual species. Reptiles are abundant; alligators are commonly found in the lakes and swamps, and the pythons are unusually large, specimens over 22 feet long having been found.

Industrial Resources.—The resources of the island are as yet poorly developed. The chief industry is the raising of cattle, hogs, and goats; goats and fowls are bartered with the ships along the coast. Rice, tobacco, nutmegs, sweet potatoes, and other food products are raised for home consumption, and there are a few primitive manufactures also for domestic use. Edible birds' nests are found in large numbers in the rocky caverns of the coasts; they are of excellent quality, being considered second only to those of Peñon de Coron (q.v.), and have brought twice their weight in silver in the Chinese market. Honey and wax are also collected and brought to the coast for trade. There are no roads, except a few portages, but a number of trails; the rivers also afford means of transportation near the coast.

People and History.—The dominating race of the northern and central parts of the island are the Tagbanúas (q.v.), a peaceful and docile race; the Moros predominate in the southern part, south of the 10th parallel of latitude. Previous to the 18th century Palawan was a part of the sultanate of Borneo; in the early part of that century the Spaniards established several garrisons in the northern part of the island for the purpose of protecting their dominions on the north from the Moro pirates, and the island was soon afterward ceded to Spain. In 1885 a special attempt was made by the Spanish government to colonize Palawan by offering settlers free transportation and other privileges, but this failed. An attempt to establish a convict settlement was also unsuccessful, and Spanish authority was recognized only along the coast. The United States troops occupied Palawan in the early part of 1902, and in June of that year civil government was established in that part of the island lying north of the 10th parallel of latitude; the part south of this parallel, known as the Country of the Moros, is as yet (1904) without civil government. The most important town of Moro Palawan is Puerto Princesa, which has not 2,000 inhabitants. The island of Balábac, lying south of Palawan, is governed in accordance with the terms of the treaty with the Sultan of Sulu. Population of the island 50,000.

Palawan Passage, the route through the Balábac Strait and along the east coast of Palawan, used by vessels in the trade between China and Manila during the latter part of the southwest monsoons, because more sheltered than the China Sea route to the west of Palawan. This route was first explored in 1850 by Captain Bates of the British navy, and soon afterward generally adopted.

Palay', an Indian climbing plant (*Cryptostegia grandiflora*) of the milkweed family. Its stalk-fibres, which are strong and white, are spun into a very fine yarn; and its milky juice forms a kind of caoutchouc.

Palazzo Pitti, pä-lät'sō pĭt'tē, a palace in Florence. See FLORENCE.

Pale, The, or **the English Pale,** Ireland, a name applied in the 16th century to that part of Ireland which was completely under English rule, to distinguish it from the parts where the old Irish laws and customs prevailed. It varied in extent at different periods, consisting of Dublin and more or less of the neighboring country.

Pa'lea, plural **Paleæ,** the bracts, usually membranous and colorless, on the receptacle of a composite plant between the florets; the chaff. Also the bracts immediately surrounding the fertilizing organs in grasses. See BRACTS; FLOWER.

Paleario, pä-lā-ā'rē-ō, **Antonio,** more correctly, ANTONIO DEI PAGLIARICI, and according to his Latinized title AONIUS PALEARIUS, Italian religious innovator: b. Veroli, Roman Campagna, 1500; d. Rome 1570. He was a teacher of rhetoric, whose reputation had spread over all Italy and abroad, and made his home especially at Sienna, but in 1567 was brought before the Holy Inquisition at Rome and three years later suffered at the stake. His principal work is a long Latin didactic poem, 'De Immortalitate Animarum.' Famous as his poetic and theological writings were, equally popular was the work attributed to him, 'Del Beneficio de Giesú Christo Crocifisso' (1543), which was translated into several languages, but in 1549 was suppressed by the Inquisition. It was published at Cambridge, England (1853), and at Leipsic with a German translation by Tischendorf (1856). Ranke maintained it to be the work of a Benedictine monk, Benedetto of Mantua. Consult: Young, 'Life and Times of Antonio Paleario' (1860); Bonnet, 'Aonio Palerio' (1863).

Palembang, pä-lĕm-bäng', Sumatra, Dutch residency in the southeastern part of the island; also the capital city of the residency. The country is drained by the Musi (or Moesi) River, along the banks of which there are valuable supplies of petroleum. An alluvial plain and plentifully watered, it is very fertile. Its native inhabitants are Moslem Malays, except a race called Orang-Kubu, living by the chase in the thickest jungles and exhibiting a very primitive culture. Palembang residency has an area of 53,497 square miles and a population (1900) of 692,317, of whom 373 were Europeans, 1,876 Arabs and 6,451 Chinese.

Its capital city of the same name lies on both banks of the Musi, 44 miles from its mouth in a swampy region, the houses being sometimes built in the very stream. The old Javanese name for the city seems to have been Malayo, so that it may be the Malajour of Marco Polo and the Mo-lŏu-yu of the Chinese geographers. An attempt has been made to prove that the town was once held by Hindus, an occupation

like that in Java. The main building is an 18th century mosque. Coffee and pepper are exported; and there is some trade in silks, carvings, and goldsmiths' wares. The Dutch built a factory here in 1618, but the country remained independent until 1812 when it was occupied by the English, from whom it passed to the Dutch in 1821. Pop. about 55,000.

Palenque, Mexico, ruined city in the state of Chiapas, on the Chacamas River, about 60 miles northeast of Ciudad Real, discovered in 1746. The tropical vegetation of the district makes it impossible to know the exact extent of these ruins. Those which have been visited show great artificial terraces or truncated pyramids, forming the level resting place for temples or palaces of calcareous stone, covered with stuccoed decorations, colored carvings in relief and undeciphered hieroglyphics. These buildings have a slightly sloping, mansard-like roof. Five of the edifices have been styled temples, though it can not be considered at all certain what their use was. They, like the largest of the buildings, which is called the Palace, are divided into two vaulted rooms, there being only the two in each "temple," where, however, the rear chamber is divided into several smaller rooms, whereas in the "Palace" there are many series of these paired rooms. The vaults of the rooms are corbeled and have a triangular arch, commonly but loosely called Mayan, as if to connect the unknown builders with the people of the Mayan empire. The external architecture is too elaborate for brief description and everywhere is covered with stucco figures in alto relievo and brilliant colors, black, blue, reds, yellow, green and white. An arched bridge 30 feet wide and 40 long and an arched waterway 10 feet high, 500 feet long and 7 feet wide have also been found and are typical of the massive architecture of "temples" and "Palace"; some of the walls of the latter are 2 and 3 feet thick. Some valuable remains of early implements and personal decorations have been found in graves on the site. But they throw no light on the question as to the identity of the builders, who have been thought by some to be the semi-mythical Toltecs or the Olmecs. Consult: Holmes, Ancient Cities of Mexico' (1895); Charnay, 'Ancient Cities of the New World' (1887); and Morgan, 'Houses and House Life of the American Aborigines' (1881).

Palermo, pä-lĕr'mō, Italy, (1) a seaport town, capital of Sicily, beautifully situated on the northern shore of the island on the Gulf of Palermo, surrounded by a fertile plain and partly enclosed by lofty hills. Its numerous spires, domes, and towers give it a very imposing appearance when approached from the sea. Two main streets, the Via Vittorio Emmanuele and Via Macqueda, intersect the city at right angles to each other. Near the centre is an octagonal space, the Quattro Canti, lined with elegant buildings in different styles of Grecian architecture and adorned with numerous statues. The two principal streets are opened into by a great number of others, mostly narrower and of an inferior description; but all well paved with blocks of lava. There is now an extensive system of electric tramways. Admirable places of resort are provided by the Marina and the Flora — the former a superb terrace about 80 yards wide, stretching about a mile along the bay; the latter, commencing in the east where the terrace terminates in a magnificent public garden regularly and beautifully laid out, and adorned with statues, fountains, and rustic temples. Here is also a botanic garden of some extent, and there are several other public gardens. The public edifices are numerous, but do not in general display much taste. The most important are the cathedral, the church of San Giuseppe, the church of San Salvatore, La Martorana, and other churches; the royal palace, finely situated and surrounded by beautiful gardens, a large and irregular pile of buildings, among which the only great attractions are the chapel of King Roger (or Palatine Chapel), rich in mosaics, "perhaps the most beautiful palace-chapel in the world," and the observatory; the archiepiscopal palace; the national museum and picture-gallery; the communal library, with about 220,000 volumes; the national library, with over 150,000 volumes; the university, attended by 1,200 students; the barracks, arsenal, courts of justice, theatres, hospitals, and several literary and charitable endowments. Palermo has a good roadstead and harbor, which has been recently improved, and a well-equipped shipbuilding yard and dry dock have been constructed. The principal articles of export are sumach, wines, oranges and lemons, sulphur, tartar, olive-oil, citrate of limes, tomatoes, tomato paste, asphalt, hides, dried vegetables, macaroni, etc.; and among the imports are coal, grain, wood, petroleum, tobacco, iron, and steel rails, sheets, bars, etc., cement, machinery, sulphates, fish, etc. The total number of vessels that cleared from the port in 1900 was 3,732, with a tonnage of 1,677,234. The manufactures of the town include gloves, marble works, etc., and there is a foundry. The fisheries on the coast are productive, and give employment to numerous hands. Palermo is the see of an archbishop, and the seat of a supreme court with jurisdiction over the whole island; of a criminal court for the province, of a commercial and several other inferior courts, and of several important public offices. Its foundation is attributed to the Phœnicians. From them it passed to the Carthaginians, who made it the capital of their Sicilian possessions and the centre of an extended commerce. The Romans obtained possession of it in 254 B.C., made it a free town, and conferred upon it many important privileges, in consequence of which it increased rapidly and became very prosperous. After the fall of the Roman Empire the Saracens became its masters, and kept possession of it till 1072, when it was taken by Roger the Norman, who founded the kingdom of Sicily. Since then it has always continued to be the capital. It has repeatedly suffered from earthquakes. This and the other vicissitudes which it has undergone is probably the reason why so few remains of antiquity are to be found within it. Some, however, still exist in its environs, which, both on this account and their own intrinsic beauty, are in many respects more attractive than the town. During an insurrection which took place in January 1848, the town was bombarded; and Garibaldi seized it in 1860. Pop. (1901) 310,352. (2) The province has an area of 1,948 square miles. Its coast consists of a series of extensive bays and bold promontories. Its interior toward the south is traversed, east

to west, by a branch of the Neptunian Mountains. The streams are numerous, but small. The soil is fertile. Pop. (1901) 785,016.

Pales, pā'lēz, in ancient Italy, a divinity who presided over fields and meadows, and was worshipped, sometimes as a god, sometimes as a goddess, in which latter character Pales was identified with Vesta or Anna Perenna. The festival of Palilia was celebrated 21 April, the anniversary of the founding of Rome, when milk and cakes of millet were offered. Cognate with Pales are "palatium," a palace, and "Palatinus," one of the seven hills of Rome, and this divinity, as protector of property, and home, is among the earliest figures that occur in Roman mythology.

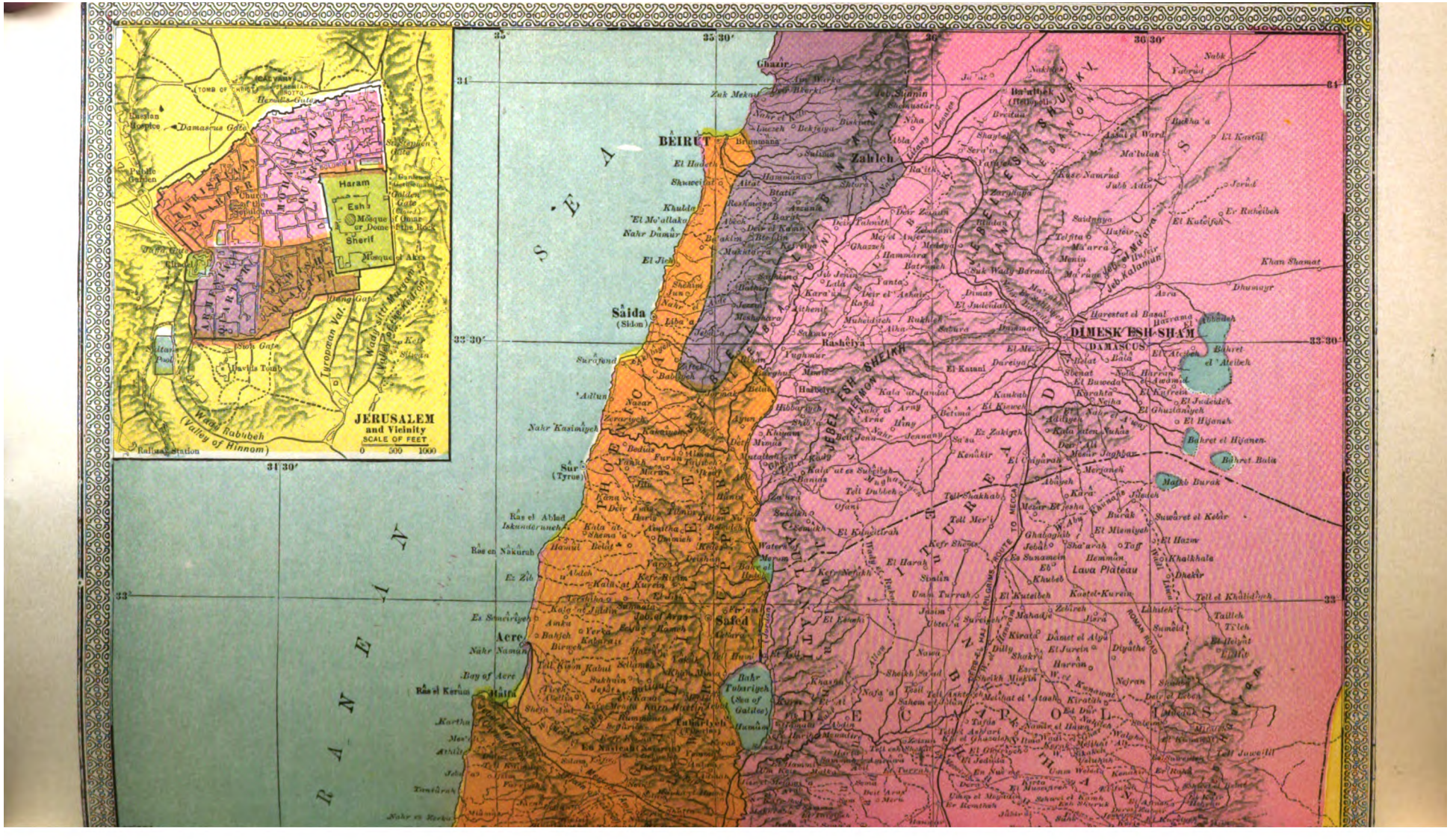
Pal'estine, also called **The Holy Land, Canaan, Judea,** and **The Land of Israel,** a classic region of Asiatic Turkey, southwest of Syria, corresponding approximately with the modern mutessarifats of Lebanon and Jerusalem. Its western shore forms the eastward boundary of the Mediterranean Sea and its north, east, and south boundaries respectively, are the Mountains of Lebanon, the Arabian Desert, and Arabia Petræa. It is situated between lat. 31° 30′ and 33° 30′ N.; lon. 34° 30′ to 36° E.; has a length north to south of about 140 miles, a breadth of about 80 miles, and an area of about 10,000 square miles.

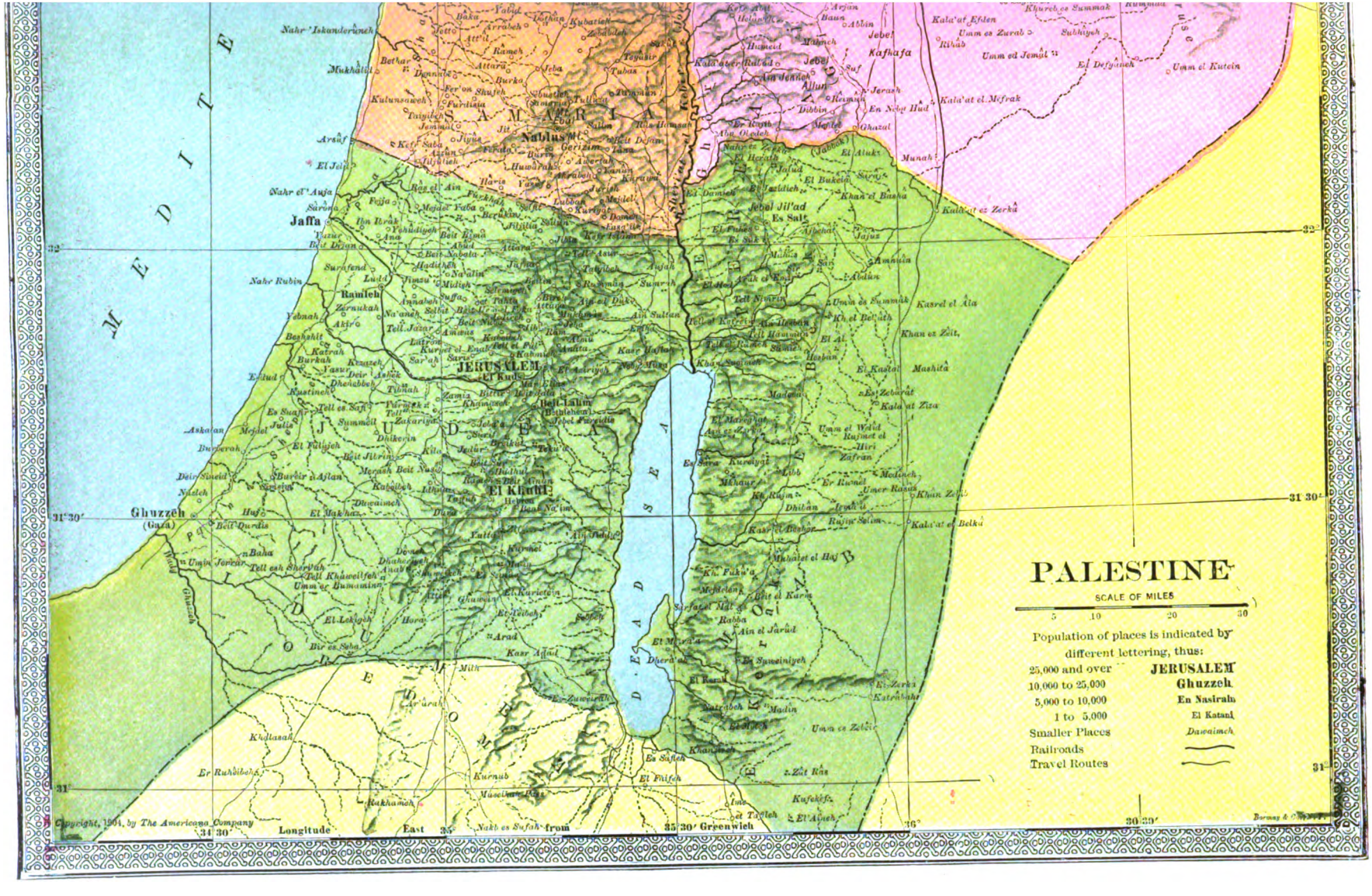
Topography and Physical Features.— The surface generally is mountainous, traversed by branches from the chain of Lebanon, one of which stretches south in a direction nearly parallel to the coast of the Mediterranean, forming the watershed between its basin and that of the Dead Sea; while another, turning more to the east, stretches along the left side of the valley of the Jordan. The mountains attain their greatest height, of about 9,100 feet, in Mount Hermon, where they first become detached from the principal chain. None of the other heights exceed 4,000 feet; but many are celebrated from the frequent mention made of them in the Bible, and from the events of which they have been the theatre. The most remarkable are Carmel, forming a promontory in the Mediterranean, on the southwest side of the Bay of Acre; Tabor, or the modern Jebel Tur, at the northeast extremity of the plain of Esdraelon; Ebal and Gerizim, in the valley of Samaria; Gilead and Nebo, or Pisgah, on the east side of the Jordan; and Zion, Moriah, and the Mount of Olives, in and near Jerusalem.

Of limestone formation, the mountains abound in caves of all varieties of size and form, many of them of Scriptural importance. The earliest mention of a cave in Scripture is in the history of Lot (Gen. xix. 30). The next is at the death of Sarah, when Abraham bought the cave Machpelah for a burying-place. This is now contained within the limits of a mosque, at Hebron, and remains in all probability just as it was when the patriarchs were buried in it. The Moslems can give no real information regarding it, for they will not enter it, dreading immediate death at the hand of Abraham's spirit, which they believe to reside in it. Caves are frequently mentioned in the books of Judges, Joshua, and Samuel, but the only one specified is that of Adullam, which has been identified with the cave of Khureitûn (the ancient Hareth), some five miles south of Bethlehem — a singular cave, or rather series of caves and chambers, extending for miles, to which the one entrance is an orifice not larger than a door, halfway down the almost perpendicular face of a precipice; this orifice is reached by a shelf or ledge of rock, along which one has to find the way cautiously to the cave. The interior is quite a labyrinth, with vaulted chambers remarkably dry and warm, but with no impure air. It could accommodate hundreds of men, all hidden in these far-extending chambers. There are caves at Deir-Dubban, not far from Khureitûn, about half-way between Jerusalem and Eleutheropolis, but these do not correspond with the scenes in David's history; although these western ones are reputed to be David's cave, and the eastern (Khureitûn), near Tekoah, Saul's caves or cave. That these huge caves or grottoes at Deir-Dubban were used both for hiding-places and dwelling-places, both in Jewish and Christian days, is pretty evident; but whether this is the place of the Adullam cave of David is not so plain. There were caves in Galilee also. The "cotton cave," or "Kotton-Megharah," under Jerusalem, is a wonderful cavity, extending under a large portion of the city. But though called a "Megharah," it is an old quarry, out of which Jerusalem was partly built, and therefore interesting, especially as the traces of the quarrymen are still visible in every recess.

Palestine has comparatively few plains, but has numerous valleys; it is the country which Moses describes, "a land of hills and valleys." The small plains are numerous, the large few; among them are the maritime plains of Phœnicia and Philistia, the river plain of Jordan, the inland plain of Esdraelon, and the mountain plain of the Bekâ, between the two Lebanons. These are widely different from each other, though within a small territory. The sea plains from Gaza to Beirût are well peopled and tilled. The Jordan plain is nearly a waste of sand, that river making no further impression upon the levels on each side than merely to fringe itself for some 20 yards with verdure. The Esdraelon plain, or "valley of Jezreel," is a fine plain of considerable extent, fertile and well cultivated. In the district of El Huleh or "the Waters of Merom," and in such low-lying districts as Merj-Sanur, between Samaria and Jenin, are marshes and at certain seasons wide tracts rendered almost impassable by the overflow of streams. The heat during the greater part of the year, from April to November, dries up most of the marshes, and scorches both hill and plain. In later ages this is more especially true, as formerly the extensive woods, orchards, vineyards, and olive-yards which clothed the country shut out the heat, cooled the soil, and retained the moisture.

Hydrography.— In Palestine from time immemorial, wells and springs have been held in such veneration, that it is as much sacrilege to destroy a well as to defile a mosque or injure a tomb. The places named from the Enspring (or fountain) and the Beer (well), are very numerous. Among these are "the Fountain of Two Calves," En-Eglaim, near the Dead Sea; the "Fountain of Gardens," En-gannim, of which name there were two cities, one in Judah and another in Issachar; the "Fountain of the Goat,"


JERUSALEM
and Vicinity
SCALE OF FEET
0 500 1000
Haram
Esh
Mosque or Dome of the Rock
Sherif
Mosque el Aksa
Damascus Gate
Herod's Gate
St Stephen's Gate
Golden Gate (Closed)
Dung Gate
Zion Gate
Jaffa Gate
Citadel
Tyropœan Val.
Wady el Jôz (Kidron)
Wady Sitt Mariam (Valley of Jehoshaphat)
Wady Rabâbeh (Valley of Hinnom)
Mamilla Pool
Sultan's Pool
Tomb of David
Tomb of the Virgin
Church of the Sepulchre
Pilate's Garden
Russian Buildings
Armenian Convent
Jewish Quarter
Moslem Quarter
Christian Quarter
Armenian Quarter
Bezetha
Mount Zion
Mount of Olives
Bethlehem
Bethany
Jericho
Jerusalem
Ramleh
Ramleh Station
Tomb of Nebi Samwil
Nebi Samwil
Kolonieh
Mizpeh
Gibeon
Gibeah
Anathoth
Ain Karim
Ain Shems
Beit Jala
Beit Sahur
Tekoa
Hebron
Beersheba
Gaza
Ascalon
Ashdod
Jaffa
Lydda
Joppa
Emmaus
Abu Ghosh
Kuryet el Enab
Deir Yasin
Shufat
Beit Hanina
Beit Iksa
Beit Surik
Kalonieh
Ain Yalo
Ain Karim
Ain Shems
Beit Jala
Beit Sahur
Tekoa
Hebron
Beersheba
Gaza
Ascalon
Ashdod
Jaffa
Lydda
Joppa
Emmaus
Abu Ghosh
Kuryet el Enab
Deir Yasin
Shufat
Beit Hanina
Beit Iksa
Beit Surik
Kalonieh
Ain Yalo
BEIRUT
Zahleh
Sâida
(Sidon)
Sur
(Tyre)
Aere
Haifa
Safed
Bahr Tubariyeh
(Sea of Galilee)
DIMESK ESH-SHAM
(DAMASCUS)
Rashêiya
Lava Plateau
Ba'albek
(Heliopolis)
Ghazir
Nahr el Kelb
Jebel Esh Sheikh
Hermon
Jebel Esh Sheikh
Hermon
Jebel Esh Sheikh
Hermon


PALESTINE
SCALE OF MILES
5 10 20 30
Population of places is indicated by different lettering, thus:
25,000 and over JERUSALEM
10,000 to 25,000 Ghuzzeh
5,000 to 10,000 En Nasirah
1 to 5,000 El Katanî
Smaller Places Daveimeh
Railroads
Travel Routes
MEDITERRANEAN SEA
DEAD SEA
SAMARIA
JUDEA
PHILISTIA
Nablus
JERUSALEM
El Khulil
Ghuzzeh
Jaffa
Ramleh
Beit Lahm
Jebel Jil'ad
Es Salt
Kafkafa
Nahr 'Iskanderûneh
Nahr el 'Auja
Nahr Rubin
Wady Ghuzzeh
Khirbet es Summak
Kala'at Ejlûn
Umm es Zurab
Umm ed Jemâl
El Defyaneh
Umm el Kutein
Kala'at el Mefrak
Munah
Khan el Basha
Kala'at ez Zerka
Kasr el Âla
Khan ez Zeit
Mashita
Kala'at Ziza
Kala'at el Belkâ
Khan Zebib
Rujm Salim
Kasr el Asbar
Mukhalat el Haj
Ain el Jarûd
Madin
Umm ez Zebûr
Khan
Es Safieh
El Fulfeh
Kufeikif
Et Taiyibeh
El 'Aujeh
Latrûn
Kubeibeh
Kastel
Kulonieh
Ain Sultan
Jericho
Ain Hajla
Kasr Hajla
Mukhmas
Jeba
Michmash
Tell Asur
Ramallah
Sinjil
Jifna
Attara
Burka
Jiljilia
Kefr Saba
Arsûf
El Jelil
Haifa
Yebnah
Akir
Katrah
Burkah
Kezaza
Deir Aseka
Dhenabba
Tibnah
Zanûa
Beit Nettif
Beit Jibrin
Dhikerin
Beit Nusib
Dûra
Yatta
Hebron
Dhaheriyeh
Tell esh Sheriah
Tell Khuweilfeh
Umm el Bumamin
El Lekiyeh
Bir es Seba
Arad
Kasr Ajlan
Khalasah
Er Ruhaibeh
Kurnub
Muzeiniat
Makhanieh
Nakb es Sufah
Ain Jidi
Zuweira
Madin
Umm ez Zebûr
Longitude East from Greenwich
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Engedi, now Ain Jiddi, on the shore of the Dead Sea, one of Judah's rocky springs; the "Fountain of Sharpness," or Swiftness, En-Haddah, one of the springs of Issachar's plains; En-Rimmon, in the southern extremity of the land; the "Fountain of the Fuller," En-Rogel, the spring of Jerusalem, known in early ages; etc. Besides these there were many other fountains all over the land. There was Hagar's "Fountain" or "Well," Beer-la-hai-roi, in the southern desert, near Beersheba; the "Fountain in Jezreel," by which Israel pitched in the battle between them and the Philistines; and others. There are the "wells" of the patriarchs in different places — the Well of Abraham at Beersheba, now represented by two, still well filled and surrounded by large stone troughs; the wells of Isaac, south of Gerar, Sitnah, Esek, and Rehoboth, of which only the last can be said to have a representative, at Ruhaiben on the great Roman road; the Well of Jacob, dug out of a spur of Gerizim, and close by Joseph's tomb; the Well of Bethlehem, which David knew so well, as no doubt the well of his shepherd-boyhood; the Well of Sirah near Hebron, where Abner was overtaken by Joab's messengers. There are a good many modern wells in use, which, though probably the remains of ancient ones, are unmentioned in Scripture. Few of these wells are properly kept, though none are gratuitously destroyed. Some have become quite unserviceable; and even Jacob's Well is in such a state of disrepair (the masonry in the upper part having fallen in) as to require almost a redigging before it can be of use. Elisha's Fountain still pours out its clear current, though little care is apparently bestowed on it.

There is but one river worthy of the name in Palestine — the Jordan, one of the most tortuous of streams; always supplied with water, though often so considerably beneath the verge of its banks as to be invisible from any distance. The Jordan originates in streams that come from Lebanon and Hermon, and unite in the Waters of Merom. It falls into the Dead Sea after a course of about 70 miles direct, or 200 including windings. Numerous streams find their way westward to the Mediterranean from Libanus and its prolongations or offshoots as far as the Hills of Judah. Equally numerous streams flow eastward from the same range into the Huleh, Sea of Galilee, Dead Sea, and Jordan. Antilibanus, sending its offshoots down the east of Jordan, and forming the Mountains of Golan, Gilead, Ammon, and Moab, is the watershed for a large tract of country between itself and the Ghor or Jordan Valley. Though the rivers are in general small, yet they are not mere summer brooks as many suppose. That but few of the innumerable wadys or watercourses are filled throughout the year is true; but still there are several permanent streams which do good service in the districts through which they pass. Passing by what we may call "Lebanon streams," which are always vigorous, there is the Zerka, a few miles north of Cæsarea; the Aujeh, a little north of Jaffa; and the Rubin, a little south of this last town; and the Mukutta or Kishon (Kutta-Kishon), which is sometimes, however, low enough, so low that when it reaches the sea it is lost in the sands. None of these are navigable, but they are rivers all the year round, and wide enough to allow boats to ply on them for some little distance. There is a vast number of water-courses in every part of the land, which would make its irrigation minute and complete were the rain sufficient to fill these, or rather sufficiently regulated and distributed over the year to keep these always filled; and were the land properly covered and its soil protected by wood, so as to moderate the heat and prevent the excessive evaporation. The words of Moses were true words when he called it "a good land, a land of brooks of water, of fountains and depths that spring out of valleys and hills." The whole land bears marks of having been better watered than at present, and contains everywhere the remains of artificial appliances, such as terraces, cisterns, and wells, by which the rain was regulated and distributed.

The lakes of Palestine are three in number, Merom, Tiberias, and the Dead Sea, the first seven feet above, the last 1,250 below sea-level. For quiet beauty the Huleh, or "Waters of Merom," with the adjoining vale, are remarkable, and for subdued attractiveness the Sea of Tiberias; but for brilliance there is nothing to be compared to the Dead Sea — the ancient Asphaltis. Whatever of tameness there may be about the former two, about this last all is grandeur, notwithstanding the aridity of its shores, and the discomforts of its exceptionally hot climate. The silvery sparkle of its waters arising from their saline and bituminous composition gives a brightness to the scene which is enhanced, not neutralized, by the dark shadows of the Mountains of Moab. These lakes form three singular depressions or troughs in the great natural groove or gorge extending from the Bekâ to the Arabah, about 200 miles. This extraordinary hollow, so far below sea-level, is kept in its present state mainly by its own heat. Were the climate to become temperate, the Sea of Tiberias would rise greatly, and transform the Jordan into a Rhine, in parts of the Ghor into a lake; the Dead Sea would swell up and overflow into the Arabah, producing changes in the whole of the southern region which it is impossible to calculate upon. The length of the Dead Sea is 45 miles; its greatest breadth 12. The density of its waters varies between 1,160 and 1,230 (pure water being 1,000). There are ancient shore-lines at a height of 1,200 feet on the surrounding hills.

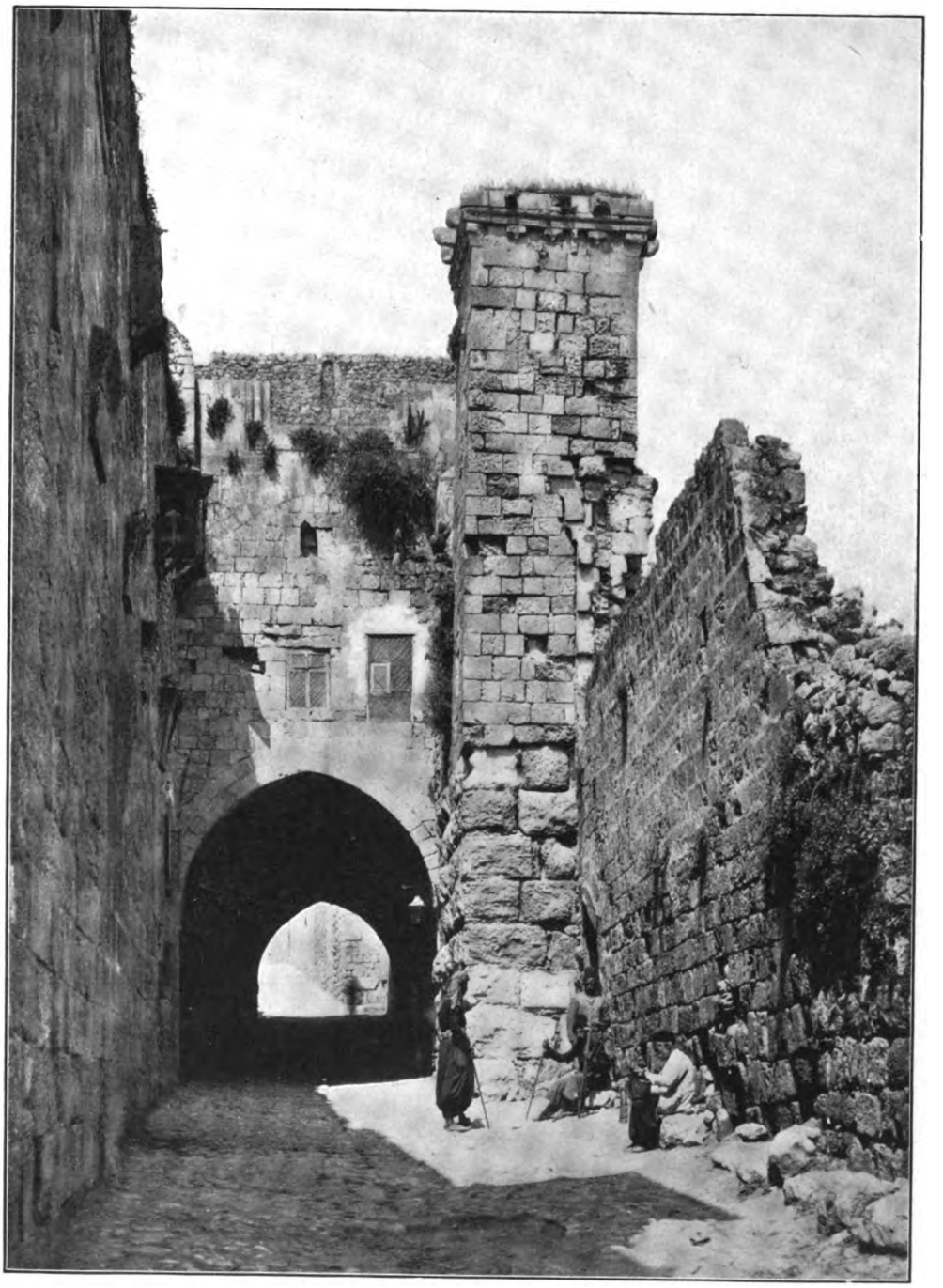
Geology.— From the southern border of Palestine, where the hill-country of Judah begins, to the extreme north, there is almost unvarying limestone. In passing from Sardinia, Italy, Greece, or Asia Minor, there is an interesting resemblance, in color, feature, and composition, between the rocks of these regions and those of Syria. Syria is, as a whole, a rugged, hilly region composed of limestone of the Secondary period; a country seamed and torn by volcanic action from one end to another; long stripes of depression and ridges of upheaval running parallel; the latter broken across and across into wide districts of table-land interspersed with hollows and valleys, with solitary hills or little groups of clustering peaks. The great masses of rock which constitute the mountains of Palestine and Lebanon are Jura limestone; compact, hard, not rich in fossils, and full of caverns and grottoes. This rock is everywhere the basis on which have been deposited in some parts extensive tracts of volcanic products; as also chalk

and chalky limestone. magnesian limestone (dolomite), sandstone, conglomerate, marl, etc. On the west of the Jordan and Arabah the chalk formation which prevails through the southern desert terminates with the desert; and the Jura limestone, beginning with the mountains south of Hebron, holds its course northward, forming the mass of the western hill-country of Carmel and of Lebanon. East of the Jordan and Arabah, where, around Petra, large masses of porphyry, sandstone, and limestone lie in close proximity, the same Jura limestone extends northward through the Belkah and the mountains of Ajlûn; and is likewise the basis on which rest the vast volcanic tracts of Haurân, Jaulân, and Lejah.

Flora and Fauna.— The flora of Palestine is large and varied; about 1,000 species have been noticed, and the whole number is probably at least 2,000. Among the trees are the cedar, oak, ash, olive, palm, sycamore, oleander, walnut, etc. Wheat, barley, and other grains are cultivated; the vine is almost neglected now, though there is no country better suited to its cultivation than Palestine.

The number of mammals inhabiting Palestine is large for the extent of the country, amounting to about eighty in number. Of the wild animals mentioned in the Bible, the lion and the *reém* or unicorn, that is, the aurochs, are no longer found in Palestine. Among carnivorous animals are the wolf, the hyæna, the jackal; the leopard, on the sides of Carmel and Gilead or in the forests of Galilee; and the bear, in Hermon and Lebanon. The wild boar is common, and much dreaded by the husbandmen on account of the ravages it commits. Other Mammalia are the wild goat, the gazelle, the coney, hare, jerboa, rat, mouse, bat, etc. Of the birds of Palestine there are over 350 species; chief among them are the roller, bee-eater, hoopoe, Smyrna kingfisher, belted kingfisher, sun-bird, great shrike, and bulbul. More noticeable than these brightly-clothed birds is the immense number and variety of the larger birds of prey— the vultures, eagles, falcons, griffons, kites, peregrines, and buzzards, which abound in every part of the Holy Land, and are at first sight its ornithological characteristic. Reptiles are numerous. They include the land and the water tortoise, the crocodile (leviathan), the chameleon, and a variety of lizards and serpents. Fishes are abundant in the Jordan and its affluents, and in the Sea of Galilee are found in immense shoals. The most numerous species are the barbel and the bream. Lower in the scale of animals are the scorpion, the locust, hornet, bee, and grasshopper.

History.— The name Palestine, derived from the Hebrew *Pelescheth,* and meaning the land of the Philistines, occurs in this sense in several passages of the authorized version of the Bible, and in several others in the Hebrew, where it is translated *Philistia.* It is properly applicable only to the southwest part of the country, stretching along the shores of the Mediterranean. It appears to have been first used in its more extended sense by Greek authors, and derived additional currency from its adoption by Josephus and Philo. The ancient name of the country was Canaan, which it evidently owed to the descent of its inhabitants from Canaan, the fourth son of Ham, and a grandson of Noah. When thus named, in the time of the patriarchs, it was parceled out among a number of independent tribes or nations; the Kenites, Kenizzites, and Kadmonites, on the east of the Jordan; the Hittites, Perizzites, Jebusites, and Amorites, in the hill-country of the south; the Canaanites proper, in the centre, from the Jordan to the coast; the Girgashites, on the east shore of the Lake of Tiberias; the Hivites, in the north, among the ramifications of Lebanon; the Philistines on the south, and the Phœnicians on the north coast. In the time of Moses the country east of the Jordan was conquered and divided among the tribes of Reuben and Gad and the half tribe of Manasseh. Under Joshua the work of conquest was carried on to the west of the Jordan; and the whole territory, though not to the extent originally promised, allotted to the remaining half tribe of Manasseh and the other ten tribes (1445 B.C.); the larger portion of the south falling to the tribes of Judah and Benjamin. Under Solomon the work of conquest appears to have been completed, and all the land which was originally promised was included within the limits of his kingdom. Under his son Rehoboam the kingdom was rent in twain, and subdivided into the separate kingdoms of Judah in the south, and Israel in the north (975 B.C.). The latter kingdom was often designated by the name of Samaria, its capital. The division of the country into tribes was completely broken up by the Captivity, which carried away ten of them to Assyria, and supplied their place by a new colony; and by the subsequent transportation of the remaining tribes of Judah and Benjamin to Babylon (584 B.C.). After the destruction of the Babylonian empire Palestine fell under the dominion first of the Persians and then of the Macedonians. When Palestine became the cradle of Christianity with the birth of Jesus Christ, the Romans had established their ascendency, and divided the region into the four provinces of Galilee in the north, Samaria in the centre, Judea in the south, and Perea, which included all the country east of the Jordan. Under Constantine Palestine, now regarded as the Holy Land, acquired new interest, and recovered in some degree from the calamities by which it had been laid desolate; and in 396 A.D., on the division of the empire by Theodosius, and the formation of two empires, a Western and an Eastern, Palestine became a province of the latter. This was its condition at the time when Islamism began to make its conquests. Palestine, unable to offer any resistance, soon fell a prey; and Omar, in 636, after taking possession of its capital, converted it into one of the provinces of his caliphate. The severities exercised toward the Christians having roused the indignation of Europe, gave rise to the Crusades, and Jerusalem became for a time the capital of a Christian kingdom. Ultimately, however, Mohammedanism prevailed, and Palestine sunk into a degraded state; from which it is only now recovering. It is only within the latter half of the 19th century that the exploration of Palestine was first carried out systematically. The most valuable results have been those achieved under the direction of the "Palestine Exploration Fund," a society organized in 1865 for the purpose of making an exhaustive exploration and an exact survey of the Holy Land. The trian-



COURT OF ANTONIO, JERUSALEM.

Mau

gulation of Western Palestine was begun in 1871 and finished in 1877. A large and detailed map of the country has been published and an immense mass of valuable information regarding topography, natural history, its interesting ruins, archæological remains, and holy places, etc., accumulated. A German society for the exploration of Palestine has existed since 1877. The present population of the country is estimated at 650,000, the Arab element being the prevailing one, and the Arabic language generally in use. The people consist partly of the fellahin or settled cultivators, artisans, etc., partly of the nomad Bedouin, who live by rearing cattle or by less reputable means. The country exports some grain, olive-oil, oranges, etc. Jaffa, Haifa, and Acre are the chief ports, Jerusalem and Nablus the largest towns. Chapels and monasteries belonging to Greek Orthodox, Roman Catholic, and various Protestant churches, abound throughout the land, and especially on and near the sites where the principal events connected with New Testament history were enacted. A railway has been constructed from Jaffa to Jerusalem and other railways in different parts are projected or in progress. Since 1850 colonies of Jews and also of Germans have been established in the country and are engaged successfully in viticulture and wine-making, notwithstanding the opposition and oppressive taxation to which they have been exposed. A feature of interest is the great amount of property acquired by the Sultan since 1885 in the Jordan Valley and other places, and administered on progressive agricultural principles. The following paragraph from a consular report of 1901, summarizes present economic conditions: «There can be no doubt that the establishment of the Jewish colonies in Palestine . . . has brought about a great change in the aspect of the country, and an example has been set before the native rural population of the manner in which agricultural operations are conducted on modern and scientific principles.»

See BETHLEHEM; CRUSADES; JERUSALEM; JEWS: NAZARETH; other localities mentioned; and for *Bibliography*, PALESTINE EXPLORATION FUND.

Palestine, Texas, city, county-seat of Anderson County; on the International & Great Northern railroad; about 135 miles north of Houston. It was settled in 1846, and in 1870, under a State law, was incorporated. It is in an agricultural region in which cotton is one of the principal products. In the vicinity are salt mines and deposits of iron ore. The chief manufactures are cotton products, iron products, and packed-beef. There is considerable trade in grain, cotton, fruit, and vegetables. The prominent buildings are the railroad offices and shops, the Y. M. C. A. building, the churches and schools. A point of interest is Fort Houston. The government is vested in a mayor who holds office two years, and in a council composed of the mayor and aldermen. Pop. (1890) 5,838; (1900) 8,297.

Palestine Exploration Fund, The, an organization founded in London 22 June 1865, for the purpose of investigating and studying the archæological and other remains of the Holy Land. Excavations were commenced in 1866 and the work has been carried on almost continuously since. Since 1869 the Society has issued a 'Quarterly Statement,' and maintains a Palestinian Museum at 38 Conduit Street, London. The Society has published Conder, 'Survey of Eastern Palestine' (1900); Clermont-Ganneau, 'Archæological Researches' (1896); Hull, 'The Geology of Palestine and Arabia Petræa' (1886); Tristram, 'The Fauna and Flora of Palestine' (1884), and many other works. See PALESTINE.

Palestrina, Giovanni Pierluigi, jō-vän'nē pē"ĕr-loo-ē'jē pä-lĕs-trē'nä (or **Pietro Aloisio**), **Da,** Italian composer and reformer of ecclesiastical music: b. Palestrina (ancient Præneste) 1526 (Haberl), or 1514 (others); d. 2 Feb. 1594. He studied in the school of music established in Rome by Claude Goudimel, and in 1551 was appointed by Pope Julius III. master of a choir of boys in the Julian Chapel, and was the first to receive the title of chapel-master. In 1554 he published a collection of masses dedicated to Pope Julius, who admitted him into the college of choristers of the pope's chapel. He was soon appointed chapel-master of St. John's Lateran, and six years later to the same post in Santa Maria Maggiore, in which he continued till 1571. About this time the Council of Trent, on re-assembling in 1562, had taken up, among other subjects, the abuses which had gradually sprung up in church music and which had grown to an intolerable height. Not only were masses founded on profane airs, often of the most frivolous kind, but the composers of the day, as their manuscripts show, not content with working upon popular airs which suggested the most unbecoming associations, actually imported the words of the profane melodies into their scores. A reform was entrusted to the pope, who appointed a commission to inquire into and regulate the matter. There was no such music in existence as the commission required, and Palestrina, almost the only composer from whose works some illustrative fragments could be drawn, was assigned the task of showing that the recommendations of the commission were as consistent with the requirements of art as they were with those of religious usage. In fulfilment of this important task he composed three masses for six voices, which by their artistic beauty and profound devotional feeling at once settled the question beyond dispute. One of them in particular, the 'Missa Papæ Marcelli,' so called in gratitude to his patron, at once established for him a position in the highest rank of musical genius, a place to which the subsequent advance of musical science has only confirmed his claim. In reward for this great achievement of his, Palestrina was appointed in 1571 chapel-master of the Basilica San Pietro at the Vatican, and musical director to the Congregation of the Oratory. He also became teacher of the musical school founded by Nanini. He likewise undertook the revision of the chants of the Missal and the Breviary. A complete edition of his works was published by Breitkopf and Hartel (1885–93). Consult: Cametti, 'Cenni Biografici di Giovanni Pierluigi da Palestrina' (1895), and the older work of Baini (1828).

Palestrina, Italy, a town in the province of and 23 miles east-southeast of Rome. It stands upon the slope of a hill and commands a

magnificent view. It was a place of Greek origin, and had become important long before Rome existed. Under the Roman Empire as Prænestе it attained great magnificence, and was often the residence of the emperors. It has numerous ancient remains, particularly those of an immense Temple of Fortune, but the only modern building of note is the Barberini Palace. Pop. 6,000.

Paley, pā'lĭ, **William,** English divine and philosopher: b. Peterborough, July 1743; d. Bishop-Wearmouth 25 May 1805. He was educated at Cambridge and in 1766 became a fellow and tutor of Christ's College. In 1767 he was ordained a priest. He held the tutorship of his college for about ten years, and his lectures during this period, which were highly successful, contained the elements of his future works. In 1776 he married and gave up his fellowship. Law, bishop of Carlisle, had already presented him with the living of Musgrave in Westmoreland, to which he retired; and he afterward received two other small livings. In 1780 he became prebendary of Carlisle, and in 1785 chancellor of the diocese. In 1794 he was made prebendary of St. Paul's, and in 1795 sub-dean of Lincoln.

His principal works are: 'The Principles of Moral and Political Philosophy' (1785); 'Horæ Paulinæ' (1790); 'View of the Evidences of Christianity' (1794); 'Natural Theology, or Evidences of the Existence and Attributes of the Deity collected from the Appearances of Nature' (1802).

As a writer Paley was distinguished by clearness and cogency of reasoning, force of illustration, and lucidity of arrangement. He had little claim to originality, and has acknowledged in a general way his indebtedness to others; but what he borrowed he generally set in a clearer light, and developed with the practical sagacity and strong common-sense which characterize the best English writers.

In his 'Moral and Political Philosophy' he follows the principles of Locke. He rejected the theory of a moral sense invented by Hutcheson to save the morality of the school of Locke, and founded his system purely on utilitarianism. The idea of the 'Horæ Paulinæ,' long considered his most original work, is said to have been suggested by Doddridge. The 'Evidences of Christianity' is mainly founded on Lardner's 'Credibility of the Gospel History,' while Butler and others contributed to its completeness, and his 'Natural Theology' has been shown to be taken, without direct acknowledgment, from a work of Bernard Nieuwentyt, a Dutch philosopher of the previous century (1654–1718), on the 'Right Use of Contemplating the Works of the Creator,' an English translation of which appeared in 1718–19. The celebrated illustration of the watch is taken almost literally from Nieuwentyt. Consult: Biographies of Paley by Meadley (1809), Edmund Paley (1824), and Lynam (1825); also Stephen, 'English Thought in the 18th Century.'

Palfrey, pâl'frĭ, **Francis Winthrop,** American lawyer and soldier, son of J. G. Palfrey (q.v.): b. Boston, Mass., 11 April 1831; d. there 5 Dec 1889. He was graduated from Harvard in 1851, was commissioned a lieutenant-colonel in the Civil War and served with gallantry. He resigned in 1863 owing to a severe wound and in 1865 was brevetted brigadier-general of volunteers. From 1872 he was register in bankruptcy. He wrote: 'A Memoir of William F. Bartlett' (1879); 'Antietam and Fredericksburg' in 'Campaigns of the Civil War' series (1882); etc.

Palfrey, John Gorham, American historian and Unitarian clergyman: b. Boston, Mass., 2 May 1796: d. Cambridge, Mass., 26 April 1881. He was graduated from Harvard University in 1815, studied theology and in 1818 accepted the pastorate of the Brattle Street Congregational-Unitarian Church, Boston, succeeding Edward Everett. He resigned in 1830 to accept the chair of sacred literature at Harvard where he remained until 1839, during which period he was dean of the faculty and one of the three preachers at the university chapel. In 1835–43 he was editor of the 'North American Review' and early allied himself with the anti-slavery movement; he delivered a course of lectures at Lowell Institute, Boston, in 1839 and in 1842, and in the latter year was elected to the Massachusetts legislature where he served until 1843. In 1844–8 he was secretary of the commonwealth of Massachusetts, and in 1847–9 served in Congress; from 1861–7 was postmaster at Boston and subsequently acted as United States delegate to the Anti-slavery Congress in Paris. He wrote much and forcibly in opposition to the slave power, was an editor of the 'Commonwealth' in 1851 and contributed to the Boston 'Whig' a series of articles, 'The Progress of the Slave Power,' which attracted much attention. He allied himself with the Free-soil party and was their candidate for governor in 1851. Among his publications are: 'Evidences of Christianity' (1843); 'The Relation Between Judaism and Christianity' (1854); 'A History of New England from the Discovery by Europeans to the Revolution of the 17th Century' (1866); etc. The last is his greatest work and a supplementary volume was added by his son F. W. Palfrey (q.v.), 'The History of New England from the Revolution of the 17th Century to the Revolution of the 18th Century' (1890).

Palfrey, Sara Hammond ("E. Foxton"), American novelist and poet, daughter of J. G. Palfrey (q.v.): b. Boston, Mass., 11 Dec. 1823. She has published: 'Prémices,' poems (1855); 'Hermann' (1866); 'The Blossoming Bud, and Other Poems' (1887); 'King Arthur in Avalon and Other Poems' (1900); 'Katherine Morne.'

Palghat, pāl-gât', India, town in Malabar district, Madras, 74 miles east of Beypur, and a station on the Madras railway. It does a flourishing business with the western coast, has a Swiss Protestant missionary station, libraries, reading-rooms, schools, and Victoria Jubilee College. Captured by the English in 1768 it served as base of operations against Tippu Sahib. Pop. (1901) 44,177.

Palgrave, păl'grāv, Sir **Francis,** English historian: b. London July 1788; d. Hampstead 6 July 1861. He was son of a Jewish stockbroker; was carefully educated at home; wrote a French version of the Homeric 'Batrachomyomachia' at eight; studied law; was married and became a Roman Catholic in 1823, when he changed his name from Cohen to Palgrave,

his mother's maiden name. He practised only in pedigree cases, devoting himself to antiquarian studies; contributed largely to the 'Quarterly' and 'Edinburgh' reviews; edited for the Crown 'Parliamentary Writs,' 'Rotuli Curiæ Regis,' 'Kalendars of the Treasury of the Exchequer,' and 'Documents and Records Illustrating the History of Scotland'; and wrote 'History of England' (1831, only one volume), 'The Rise and Progress of the English Commonwealth' (1832); 'Truths and Fictions of the Middle Ages: the Merchant and the Friar' (1837); 'The Lord and the Vassal' (1844), and 'The History of Normandy and England' (1851–64). He was knighted in 1832. His work, though faulty in some details, did much to revive popular and critical interest in the Middle Ages.

Palgrave, Francis Turner, English poet and critic, son of Sir Francis Palgrave (q.v.): b. Great Yarmouth 28 Sept. 1824; d. 24 Oct. 1897. He was educated at Charterhouse and Oxford, becoming fellow of Exeter College in 1846. He was employed in the Education office after acting as Gladstone's private secretary for a time, and 1850–5 was vice-principal of Kneller Hall, a normal college at Twickenham. He became a friend of Tennyson with whom he passed many summers in Europe, and in 1884 resigned from the Education office, in which he had risen to the post of assistant secretary. In the following year he succeeded his old friend John Campbell Shairp as professor of poetry at Oxford. He was a man of remarkable sweetness of character, sensitive and cultured; his book, 'The Passionate Pilgrim' (1858), is a spiritual autobiography, which also gives some light on the facts of his life. He is best known as the critical editor of 'The Golden Treasury' of English lyrics (1861; 2d series 1896), the first volume of which ranks as a classic anthology. He edited several other volumes of selections, from Shakespeare (1865), of hymns (1867), of 'Stories for Children' (1868), of lyrics (1871), from Herrick (1877), from Tennyson (1885), etc., and wrote 'Visions of England' (1881), and 'Amenophis' (1892).

Palgrave, William Gifford, English diplomat and Orientalist, son of Sir Francis Palgrave (q.v.): b. Westminster 24 Jan. 1826; d. Montevideo 30 Sept. 1888. He was educated at Oxford; went to India immediately after graduation; and entered the Bombay native infantry, which he soon left to become a member of the Society of Jesus and to undertake missionary work in southern India. In 1853 he went to Syria as a Jesuit missionary. He narrowly escaped death in the Damascus massacre of June 1861, being saved only by his perfect coolness and his wonderful knowledge of native dialects and customs. In England, Ireland and France he attempted to rouse indignation at the Syrian massacres. Napoleon III. became interested in him, and in 1862 sent him across central Arabia to learn the feeling of the Arabs toward France,—an adventurous journey described in Palgrave's 'Narrative of a Year's Journey through Central and Eastern Arabia' (1865). He decided that there was no chance for Christian missions in Arabia, left the Society of Jesus, and entered the English diplomatic service. He was sent to Abyssinia in 1865, was British consul in Trebizond 1867, in St. Thomas 1873, in Manila 1876, in Bulgaria 1878, and in Siam 1879, and in 1884 became minister to Uruguay. He wrote 'Herman Agha,' an Eastern romance (1872); 'Essays on Eastern Questions' (1872); 'Ulysses: Scenes and Studies in Many Lands' (1887), and 'A Vision of Life' (1891), a mystical poem.

Pâli, pä'lē, one of the most ancient of the Prâkrit dialects. Lassen traces it to western Hindustan, and declares it to be related to the S'auraseni and Mâhârâshtri. It was the sacred language of the southern Buddhists, and died out in India with their expulsion, but they carried it to Ceylon, Indo-China, and Burma, where it was superseded as a spoken language by the vernacular. Pâli is derived from a dialect much like Sanskrit, which it closely resembles. Pâli literature embraces the sacred writings of Buddhism, and also many works on ethical, philosophical, historical, and other subjects. The greater part of the Buddhist scriptures, or Pitakas, has been translated into English. One of the most interesting portions is the Jatakas, a complete translation of which has been published under the editorship of Prof. Cowell. The Pâli text was edited by Fausböll. The Pâli works of a non-sacred character are: the Dîpavamsa, a history of Ceylon to 300 A.D., the Mahâvamsa, another history of Ceylon, written about the end of the 5th century A.D., the Dathavamsa, a history of Buddha's eye-tooth, the Milindapañha, a disputation between a Buddhist priest and the Greek king Milinda of Bactria, and the Rasavahini, a collection of fables and legends. Consult: Burnouf and Lassen, 'Essai sur le Pâli' (1826); Childers, 'Pâli Dictionary' (1875); Frankfurter, 'Pâli Handbook' (1883); Müller's 'Pâli Grammar' (1884).

Pal'impsest Gk. *palin,* back, again, *psestos,* rubbed, a written page prepared by erasure for being filled with new matter. Both the Greeks and Romans erased manuscripts for the purpose of again using the parchment. Cicero banters his friend the lawyer Trebatius upon his economy in using palimpsests in his correspondence, and expresses the hope that it is his own consultations and not Cicero's letters that he erases. No ancient palimpsests have come down to us. Probably the use of them by the Greeks and Romans was attended with no disadvantage to literature. When, however, the Greek and Roman commonwealths had been overthrown, and almost all the ancient manuscripts preserved in Europe were in the monasteries, the use of palimpsests began to prevail in the Middle Ages. It is still a matter of controversy whether literature has gained or suffered by the practice. On the one hand, it is held that but for the value of their material, the scraps of ancient manuscripts which have come down to us in the form of palimpsests would have been lost. On the other, it is believed that valuable manuscripts have in this way been ruthlessly destroyed.

It was in the 7th century, when Caliph Omar had cut off the supply of papyrus furnished by Egypt, that a great deficiency of parchment was felt. This deficiency continued until the invention of paper. The use of palimpsests increased until the 11th century, when it reached its height. Some declare that nearly the whole of ancient literature was thus lost in the 8th century. From the time of the Renaissance this

practice was discountenanced; it was forbidden by edicts, but it did not entirely cease until the introduction of printing. In the East the use of palimpsests began much later, and never became so general as in the West. The scarcity of parchment was increased by the demand for legal documents. The monasteries of Bobbio, Fulda, St. Gall, and Mainz were among the most extensive manufacturers of palimpsests. That which replaced the ancient manuscripts was writing of an ecclesiastical character, lives of the saints, and copies of the church services.

At the Renaissance attempts were made to decipher the ancient and underlying writing on palimpsests, but it was not till the 18th century that any progress was made. Knittel (1761) deciphered fragments of a Bible of Ulphilas, and Bruno discovered some entirely new fragments of Livy and Cicero. Niebuhr and others made subsequent discoveries, and the subject was taken up systematically and pursued with great success by Angelo Mai (q.v.), librarian successively of the Ambrosian and Vatican libraries.

The processes employed in deciphering palimpsests vary according to the nature of the manuscripts. Those which have been scraped and rubbed with pumice-stone and afterward bleached are nearly indecipherable. Those which have been merely washed with lime-water and dried are revived by chemical processes. Various recipes which have been found successful are used successively till the right one is found. The result of the researches made is on the whole disappointing, because the monks only made use of imperfect copies and fragments of ancient writings for their palimpsests, and carried on the re-manufacture of clean parchments wholesale, mixing up various manuscripts, cutting them into fresh shapes, and thus obliterating forever the connection of the original works. A very large proportion of the discoveries thus made are fragmentary, but many of the fragments are of great value. The most remarkable discovery of a palimpsest in recent times is that of the Syriac version of the four Gospels by Mrs. Agnes Smith Lewis (q.v.) in St. Catherine's Monastery, Mount Sinai (1895).

Pal'indrome, the name given to any verse or line which reads the same either forward or backward; for example that which is put in the mouth of Satan — *Signa te, signa, temere me tangis et angis* (cross thyself, cross thyself, you touch and torment me in vain), or as "Madam I'm Adam."

Palingen'esis. See RECAPITULATION THEORY.

Palinuro, pä-lē-noo'rō, **Cape,** Italy, promontory in southern Italy, jutting into the Tyrrhenian Sea, northeast of the Gulf of Policastro, about 42° 2′ N. and 15° 17′ E., in classical times Palinurum Promontorium, and now sometimes called Cape Spartimento. The end of the cape forms a rocky and dangerous peninsula, on which Roman fleets were wrecked B.C. 253 and 36. The name is Greek and is the origin (not the outcome) of the story of the death and burial of Æneas' pilot, Palinurus.

Pal'isade Cells and Parenchyma, elongated cylindrical cells standing upright between the surface layer of the upper side of a leaf (q.v.) and the thicker layer of loose assimilation cells forming the under side. The palisade cells characterize the "palisade parenchyma," which gives strength to the leaf and contains most of its chlorophyll.

Palisades, The, a rocky cliff on the right bank of the Hudson River (q.v.), extending from Fort Lee, N. J., to the hills of Rockland County, N. Y., a distance of about 15 miles. They are of basaltic trap rock, a formation which was intruded in a rift of the earth's surface between layers of sandstone and shale, and cooling in a columnar form, gave these cliffs their peculiar perpendicular formation. They are from 350 to 500 feet in height, broken and fantastic in appearance, and are considered one of the most remarkable and picturesque cliff formations in the world. A considerable amount of rock has been taken from the Palisades for building purposes, and it was feared that they would be badly injured and their beauty destroyed. The two States of New York and New Jersey therefore organized a commission in 1900, known as the Commission of the Palisades Interstate Park, the object of which is "to secure against vandalism and to preserve the natural beauty of the Palisades." To do this it was found necessary to acquire title to 73,900 feet of shore front; the report for 1903 showed 36,423 feet of this was yet to be acquired, and that the total expenditures of the commission for land, buildings, improvements and riparian rights up to the date of report had been $305,911.77.

Palissy, pä-lē-sē', **Bernard,** English artist and philosopher: b. La Capelle Biron (Lot et Garonne), according to D'Aubigne 1499, according to other biographers about 1510; d. Paris 1589. Having been selected in 1543 to draw up the plan of a government survey in his neighborhood the remuneration he received enabled him to carry on experiments in enamels, to which his attention had been accidentally turned, and on which he had for some time been engaged. Being ignorant of the art of the potter he had to grope his way, making experiments with all kinds of materials, which for a long time were unsuccessful. He was compelled at last, by his own account, to burn his furniture in order to keep in his oven. The fatigue he endured in conducting himself all the operations necessary to the completion of his discovery was excessive. At length, after 16 years of unremunerated labor (1538–54), he succeeded in producing a pure white enamel, affording a perfect ground for the application of decorative art. He was now able to produce works in which he represented natural objects grouped and portrayed with consummate skill. His reputation rapidly spread, and he acquired a patron in the Duke de Montmorency. His sculptures in clay and his enamelled pottery once known became recognized as genuine works of art, and came into demand for the decoration of the houses of the great. Religious persecution, however, which had spared him in obscurity, fastened on him as soon as he had begun to attain to wealth and distinction. He was first imprisoned at Bordeaux on the charge of being a Calvinistic preacher (1562), and was threatened with death, when he was rescued by the Duke de Montmorency, who, to save him from the provincial authorities, procured him the title of *inventeur des rustiques figulines du roi,* with which he went to establish

himself at Paris. Here he was patronized by Catharine de' Medici, who gave him a site for his furnaces on the present situation of the palace of the Tuileries, where the remains of them were discovered in 1865. Here he continued to work for some years. He also gave for several years in Paris lectures on scientific subjects, the substance of which is probably contained in his 'Discours Admirables' (1580). He was the first in France to substitute facts and demonstrations in the teaching of science for mere hypothesis. He established a rational theory of crystallization, and his classification of salts was nearly perfect. His teaching again excited the jealousy of his theological opponents. He was arrested in 1588 and thrown into the Bastille, where he died at the age of 90, according to D'Aubigne, who knew him personally; or of 80, according to his other biographers. His 'Complete Works' (1880) contain his famous autobiography. A monograph on the artistic work of Bernard de Palissy by C. De Lange and C. Borneman appeared in 1863–5. A biography of him has been written by Henry Morley (1852).

Palissy Ware. See PALISSY, BERNARD.

Palk (pâk) **Strait,** the northern and narrower part of the channel separating Ceylon from the southeastern coast of India, the southern and wider part being the Gulf of Manar. The strait is 80 miles long, 40 to 85 miles wide, but shallow and scarcely navigable. The Pambam Passage broken with islands connects the two parts of the channel.

Pal'ki. See PALANQUIN.

Pall, pâl (Lat. *palla*), generally, the covering of a bier, but specially applied to the small linen cloth, usually stiffened with cardboard, employed to cover the chalice. The upper part of the pall may be of silk, and colored according to the season. It is often richly embroidered. While part of the corporal is sometimes laid over the chalice as a covering, the pall or palla, according to Pope Innocent III., is not to be considered identical with the corporal.

Pall-mall (pĕl-mĕl') **Game,** an ancient pastime in which a round box-wood ball was struck with a mallet or club and sent through a ring elevated upon a pole, standing at either end of an alley. The game was formerly practised in Saint James' Park, London, and gave its name to the street called Pall Mall.

Pallace'æ, the stink-horn toadstools. See FUNGI.

Palla'dian Architecture, a variety of 16th century Italian architecture so named from Andrea Palladio (q.v.). It was founded upon the Roman antique as interpreted by the writings of Vitruvius, but rather upon the secular buildings of the Romans than upon their temples. It is consequently more applicable to palaces and civic buildings than to churches. A characteristic feature of the style is the use of engaged columns in façades, a single range of these often running through the two principal stories. It was introduced into England by Inigo Jones, a follower of the Venetian school of Palladio.

Palladio, pāl-lā'dē'ō, **Andrea,** Italian architect: b. Vicenza, Venetian territory, 30 Nov. 1518; d. Venice 19 Aug. 1580. He was originally a stone-cutter, and at the suggestion of the poet and savant Trissino (see TRISSINO, GIOVANNI GIORGIO), went to Rome for the purpose of studying ancient and modern art. Returning to his native country he designed many palaces, and county houses of great beauty and dignity. His designs were also sought in England and other parts of Europe. Palladio belongs to the masters who, in the 16th century, by the study of the works of Roman builders, created a new era in architecture. Among his works the theatre degli Olimpici, in his native place, is the most important. Venice also owes to him many of her finest buildings. The villa built by Lord Burlington at Chiswick (since enlarged by James Wyatt) was from a design of Palladio, as was also a bridge at Wilton, the seat of the Earl of Pembroke. The majestic simplicity of antiquity was always present to his mind, and Algarotti called him the Raphael of architects. His published works include 'Antichità de Roma' (1554); and 'Quattro Libri dell' Architettura.' He also provided designs for Barbaro's edition of 'Vitru vius' and illustrated Cæsar's 'Commentaries.' His life was written by Temanza (1763). Consult the biography by Fletcher (1902).

Palla'dium, among the Greeks, a statue or image of Pallas (Minerva), which is said to have fallen from heaven, and to have been found by Ilus, who placed it in a temple in his new city (Ilium). It was believed by the Trojans that their city would be invincible so long as it contained the Palladium. Ulysses and Diomedes, to remove this impediment to the capture of the city, are said to have carried it off. The Romans, however, pretended that it was brought to Italy by Æneas, and preserved in the temple of Vesta at Rome. It was considered holy and the protecting divinity of the city. The term palladium has figuratively acquired the sense of bulwark, protection, sanctuary.

Palladium, atomic weight 106.5, a metal resembling platinum, discovered by Wollaston (1803) while purifying a quantity of crude platinum. Occurs native in platinum ores, but principally alloyed with gold and silver in a gold ore from Brazil. Obtained from these ores by complicated processes which ultimately give the palladium as palladium cyanide. This decomposes on ignition, giving pure spongy metallic palladium. A ductile, malleable, white metal, specific gravity 11.8 and having the lowest melting point of all the platinum metals. It is not acted on by atmospheric oxygen or moisture, slowly attacked by strong nitric, hydrochloric, or sulphuric acids, but very easily by aqua regia. In the spongy form it has the power of absorbing gases. Freshly ignited palladium will absorb about 350 times its own volume of hydrogen at room temperature and nearly twice as much when heated to the temperature of boiling water. It forms two compounds with oxygen PdO, palladous oxide, and PdO_2, palladic oxide. Two classes of salts are known related to these two oxides, the palladous salts being the most important. Palladium is used in the manufacture of many fine scientific instruments because of its properties of hardness, color, and resistance to the action of the atmosphere.

Palladius, pa-lā'dĭ-ŭs, Greek patristic writer of the 4th century. His 'Historia Lausiaca' dedicated to Lausus, chamberlain of

the imperial court, gives us the results of his journeys among the principal districts of the Roman empire, where monks and hermits had settled. He is indeed the Herodotus of the early Church, whose self-chosen task was to travel from one religious house or colony to another, curiously inquiring about the life of each, and picking up from the gossip of the highway or actual observation a rich fund of information which has enabled him to give a living picture of the ascetic phase of church life in Palestine, Egypt and Syria. His works are published in Migne's 'Patrologia Græca,' Vol. XXXIV. Consult Preusschen, 'Palladius and Rufinus' (1897).

Palladius, pa-lā'dĭ-ŭs, **Rutilius Taurus Æmilianus,** a Roman writer of the 4th century of our era. He wrote 'De Re Rustica,' a didactic work in 14 books on agriculture, the topics being arranged according to the seasons, and forming a sort of farmers' calendar. The first book is introductory, and the last, written in elegiac distichs, is a poem on the art of grafting, the other 12 containing accounts of the agricultural and gardening operations for each of the 12 months. Much of the work is simply borrowed from earlier writers. The poem was popular in the Middle Ages, and there is an English translation of it belonging to the 15th century. An English translation by Thomas Owen appeared in 1803, and others have followed.

Pal'lah, or **Impalla,** a large reddish, bush-ranging South African antelope (*Æpyceros melampus*), called "roibok" by the Boers. The horns were lyrate, abruptly bent, and were possessed by the males alone. These animals were formerly numerous, but were not only especially a prey to the large carnivores, but were shot wrathfully by Boers and sportsmen, because they were extraordinarily suspicious and alarmed all the game in the neighborhood by loud whistling cries the moment they discovered a hunter's presence. Now, therefore, they are rare. Consult the works of sportsmen-naturalists in Africa; and Lydekker, 'Book of Antelopes' (1896); Sclater, 'Fauna of South Africa, Mammals' (1900).

Pallas, păl'ăs, freedman and favorite of the Roman emperor Claudius: d. 63 B.C. He was a slave of Antonia, mother of Claudius; was set free by his master when he became emperor; together with Callistus and Narcissus was the real power during Claudius' reign; induced the emperor to marry Agrippina, his own niece, and to adopt Nero; and with the connivance and assistance of Agrippina, now his mistress, poisoned Claudius and brought Nero to the throne. He was subsequently poisoned by Nero's order.

Pallas, päl'läs, **Peter Simon,** German naturalist and traveler: b. Berlin 22 Sept. 1741; d. there 8 Sept. 1811. He studied there, in Leyden, and in England, devoting himself especially to the classification of collections of zoological specimens, and in 1768 was invited by Catharine II. of Russia to become adjunct of the St. Petersburg Academy and to lead a scientific expedition through Russia in Asia. This trip of exploration, undertaken with Sokoloff, Suyeff, and Rytchkoff, and lasting more than six years, was his greatest work, the specimens collected forming the nucleus of the Academy's museum in St. Petersburg. In 1777 he became a member of the Imperial Topographical Survey, and in 1787 was appointed historiographer of the College of Admiralty. He retired in 1796 and returned to Berlin not long before his death. His published works include a description of his travels in Asia (1771–6), 'Flora Rossica' (1784–1815); 'Icones Insectorum' (1781–98), a study of the Mongolian races (1776–1802); and a great and incomplete 'Vocabularium Linguarum totius Orbis' (1787–9).

Pallas, păl'ăs, in astronomy, one of the minor planets revolving round the sun between Mars and Jupiter. It was discovered in 1802 by Olbers at Bremen. It revolves round the sun in 4.61 years. The eccentricity of its orbit is 0.23969, and its semi-axis major is 2.77 times that of the earth's orbit. Its diameter is 172 miles. When nearest the earth in opposition Pallas shines as a full seventh-magnitude star, with a decided yellowish light.

In Greek mythology, the goddess of wisdom. See ATHENE; MINERVA.

Pallavicino, păl-lā-vē-chē'nō, **Ferrante,** Italian satirist: b. Plaisance 23 March 1615; d. Avignon 5 March 1644. He took orders; became a canon of Augustine; had to escape to Venice because of his broken vows; wrote there against Odoardo, duke of Plaisance, but had to leave Venice in turn because of his immoral life and writings; spent some time in Germany; again went to Venice, where he was imprisoned, but soon set free; then broke entirely with the Church and bitterly and foully attacked the Pope in 'Il Divorzio Celeste.' Venturing into France he was arrested by the papal officers, found guilty of heresy, and beheaded.

Pallavicino, Sforza, Italian cardinal and ecclesiastical historian: b. Rome 1607; d. there 1667. He was educated in the Collegio Romano; was made governor successively of Iesi, Orvieto, and Camerino by Urban VIII.; at 30 entered the Jesuit order; soon afterward became professor of philosophy and theology in the Roman College; and made such a name by his philosophical treatises that he was chosen by the Catholics to write a party history of the Council of Trent which refuted the work of Paolo Sarpi.

Pal'len, Condé Benoist, American journalist and author: b. St. Louis, Mo., 5 Dec. 1858. He was graduated from Georgetown University in 1880 and was editor of 'Church Progress,' a religious weekly in St. Louis, 1887–97. He has published 'The Philosophy of Literature' (1897); 'Epochs of Literature' (1898); 'What is Liberalism?' (1899); 'The New Rubaiyat,' a poem (1899); 'The Feast of Thalarchus' (1901); 'The Death of Sir Launcelot and Other Poems' (1902).

Palliser, păl'ĭ-sẽr, SIR **William,** British inventor and engineer: b. Dublin 18 June 1830; d. 4 Feb. 1882. He passed through the Staff College at Sandhurst, and in 1855 obtained a commission in the Rifle Brigade, was subsequently transferred to the Hussars, and retired from the army in 1871. Besides inventing the projectiles and guns which bear his name he devised many improvements in fortifications, etc. He was knighted in 1873, and for a few years sat in the House of Commons as member for Taunton. See PROJECTILES.

Pallium, an article of ecclesiastical dress consisting of a band of white wool, some three inches wide, with two narrower bands of the same material, one of which hangs down the back and the other over the breast. It is embroidered with four purple crosses. It is a part of the vestments of the pope, patriarchs, and archbishops. It is sent by the pope to the patriarchs and archbishops as a token that they are invested with the fulness of the episcopal office. It is sometimes, though rarely, also sent to bishops. When a bishop is elected or appointed to a metropolitan see, he at once solicits the pallium from the pope within three months after his consecration or confirmation. The pallium is made from the wool of two lambs annually presented in the Church of St. Agnes, Rome, by the apostolic sub-deacons, and woven by the nuns of Torre de' Specchi, to whom alone belongs the privilege. The historical origin of the pallium is not known, or, at least, wrapt in such obscurity that no definite conclusion has ever been arrived at. Some writers believe that it was first conferred upon bishops by the emperors as a mark of dignity, and then passed over to a purely ecclesiastical usage. It is only worn on solemn and special occasions. Consult: Thurston, 'The Pallium' (London 1802); Vespasiani, 'De Sacri Palli Origine' (Rome 1856).

Palm, pām, **Johann Philipp,** Bavarian bookseller and publisher: b. Schorndorf, Bavaria, 1768; d. Braunau, Bohemia, 26 Aug. 1806. The firm of which he was a member published a pamphlet, 'Germany in Her Deepest Humiliation' (1806), which was hostile to Napoleon and his measures. It was brought to the attention of Napoleon who ordered the arrest of Palm, had him tried by court-martial, and though the pamphlet was to the publisher merely trade matter, he was sentenced to death and executed at Braunau on the following day. This act aroused the deepest indignation in Europe as well as in Germany where the hatred of the Germans for Napoleon was already intense. Consult Schultheiss, 'Johann Philipp Palm' (1860).

Palm Butter, Oil, Sugar, Wax. See PALMS.

Palm-cat, or **Palm-civet,** any of several animals of the civet family (*Viverridæ*), and of the genus *Paradoxurus,* known also as tree-cats, toddy-cats, from their habit of climbing palm-trees to eat their fruit. They inhabit India and southeastern Asia, the Malay Archipelago, etc., and somewhat resemble large cats with comparatively short legs. The best known is the Indian species (*P. niger*), which is often kept about houses and subsist mainly on animal food, such as rats, small birds, lizards, etc. Consult: Blanford, Jerdon, Blyth, Wallace, and other authorities on East Indian zoology; and Allen's Natural History, article 'Cats, Civets, and Mungooses' (1894).

Palm-crab, a large burrowing land-crab which feeds upon cocoanuts. See ROBBER-CRAB.

Palm-kale, a variety of cabbage extensively cultivated in the Channel Islands and also in Italy. It grows to the height of 10 or 12 feet, and with a crown of leaves at top it has much the aspect of a palm.

Palm Oil. See PALMS.

Palm Sunday, the Sunday next before Easter Day, so called because on that day is celebrated Christ's last entry into Jerusalem before his Passion, where palm branches were strewn in his way by the multitude. In some churches palms are employed as decorations at the services on this Sunday, and fragments of them distributed to the people.

Palm-swift. See SWIFT.

Palm-weevil, or **Grugru,** a large curculionid beetle (*Rhyncophorus palmarum*), 1½ inches long, common throughout the American tropics, which places its eggs in holes bored by the beak of the female in the wood of palms, especially the cabbage palms of the genus *Euterpe.* The grub, as soon as hatched, begins to eat its way forward to the spongy pith of the tree, where it feeds and grows into an exceedingly fat and oily creature, sometimes three inches long by one in diameter, which is eaten roasted by all kinds of people, and eaten with pepper is regarded as one of the delicacies of the tropics. Similar species occur elsewhere in warm countries. The species above mentioned (*R. palmarum*) also occurs in southern California; and a similar species (*R. cruentatus*) infests the palmetto of the Southern States. Java has a well-known species (*R. ferrugineus*), whose grub has long been a table-delicacy in the East. Consult Kirby and Spence, 'An Introduction to Entomology' (1828), and general works.

Palma, Giacomo, jä-kō'mō päl'mä, called IL VECCHIO, Italian painter: b. probably, Serintola, near Bergamo, about 1480; d. Venice 1528. He is supposed to have been a pupil of Giovanni Bellini, but little is known regarding his life. It may be divined from the pictures that go by his name that he imitated one after another several great artists of the Venetian school and many of his works have been attributed to Giorgione, whose coloring he took for his standard of excellence. The Italian churches have multitudinous examples of paintings called «Santa Conversagione» representing the Virgin and the Child, and the donor of the picture presented to them by his patron saint. Of these large compositions Palma Il Vecchio painted very many. He was also successful in mythological subjects, and his landscape backgrounds are exquisite. His works place him among the foremost painters of his time. Some of his best known paintings are 'Adoration of the Shepherds'; 'The Holy Family'; 'Mars and Venus'; 'The Mystical Marriage of Saint Catherine'; 'Divine and Heathen Love'; 'Portrait of Andrea Palladio in his Youth.'

Palma, Giacomo, called IL GIOVANE, Italian painter, grand-nephew of the Elder Palma: b. Venice about 1544; d. there 1628. His early work was excellent, comparing in fresh coloring with Titian, who greatly influenced him. Later his vicious mannerism grew so as to be a predominating feature of his work. Hence Lanzi called his the last good and first bad painter of Venice.

Palma, Ricardo, Peruvian author: b. Lima, Peru, 7 Feb. 1833. He was exiled to Chile in 1860 as a result of implication in a political revolt, but upon his return became secretary to President Balta. Later he served as senator and then was assistant in the National Library.

After the sack of the library by the Chileans in 1881 he reorganized it, gathered the remaining fragments, and assisted by gifts from foreign governments succeeded in re-opening the library in 1884. He is the author of several works of fiction, some poetry, and the historical work 'Anales de la Inquisición de Lima' (1863). Since 1870 he has been occupied in recording the traditions and legends of Peru.

Palma, Thomas Estrada, Cuban patriot: b. Bayamo, Santiago province, Cuba, 15 July 1835. He studied law, but did not enter practice; during the revolution of 1868–78, known as the Ten Years' war, rose to be a general in the Cuban forces; and after nearly nine years of service was captured and imprisoned in Spain until the close of the insurrection. At the time of his imprisonment he had succeeded Cespedes in the rather empty honor of president of the Cuban provisional government. After his release he went to Honduras, where he became postmaster-general of the republic. Later he removed to the United States, where he opened a school for Latin-Americans at Central Valley, N. Y. This institution he successfully conducted until the beginning of a fresh revolt in Cuba in 1895, when he was elected delegate-at-large and minister plenipotentiary of the Cuban republic, and took charge of the well-known Junta in the United States, which purchased arms, organized filibustering expeditions, and otherwise aided the army in the field. In 1901 Palma was almost unanimously elected president of the republic, and on 20 May 1902 was inaugurated, the United States on that day turning over to the new government the administration of the internal affairs of the nation. Palma proved very efficient in his administration, his economy in financial matters being particularly worthy of comment.

Palma, (1) the capital of Majorca (q.v.), the largest of the Balearic Isles, and of the Spanish province of Baleares, on the Bay of Palma indenting the south coast. The city, encircled by a fortified wall, stands in the midst of orange plantations, and with its Moorish architecture has a very picturesque effect. It is one of the most aristocratic of European cities. A railway connects it with Manacoar on the east coast. Its chief edifice is the Gothic cathedral (1322–1601); it contains the tomb of King Jayme II. of Aragon, and a valuable collection of church ornaments. In the church of Saint Francis is the tomb of Raymond Lully (q.v.). Other notable structures are a fine exchange (1426–46), an old Moorish palace, a 16th-century town hall, and several fine modern buildings and institutions. Its numerous manufactures include woven silks and woolens, jewelry, etc., and it has a considerable trade in wine, oil, cattle, and agricultural produce, the total annual value of its commerce averaging $8,000,000. Its fine harbor is protected by a mole. Pop. (1900) 63,783.

(2) A town of Sicily, 14 miles southeast of Girgenti. Pop. 11,702. (3) The name of one of the larger of the Canary Islands (q.v.).

Palma Christi. See CASTOR-OIL PLANT.

Palmas, päl'mäs, **Cape.** See CAPE PALMAS.

Palmer, päm'ér, **Alice Freeman,** American educator: b. Colesville, N. Y., 21 Feb. 1855; d. Paris, France, 6 Dec. 1902. She was graduated from the University of Michigan in 1876 and was the next year a teacher of the classics and mathematics at Geneva Lake, Wis. From 1877 to 1879 she was principal of the high school at East Saginaw, Mich., becoming in the last-named year professor of history in Wellesley College. In 1882 she became acting president, and in 1882 president of that institution, which position she retained till her marriage in 1887 to Professor G. H. Palmer (q.v.) of Harvard University. During her administration the college standard of scholarship was raised, the number of students very greatly increased, and several important buildings added. In 1892–5 she served as non-resident dean of the woman's department of the University of Chicago. She took an active interest in educational and reform associations, was a member of the Massachusetts State board of education from 1889, and lectured frequently on educational and municipal topics. In 1882 she received the degree of Ph.D. from the University of Michigan, and that of L.H.D. from Columbia in 1887, while in 1895 she and her husband each received the degree of LL.D. from Union University.

Palmer, Anthony, American colonial governor: b. England about 1675; d. Philadelphia, Pa., May 1749. He was a merchant in Barbados for some time, but in 1707 purchased a large tract of land in Philadelphia where he then settled. In 1708 he was a member of the provincial council and served until his death. When Lieutenant-Governor George Thomas resigned in 1747 the government devolved upon Palmer, who was president of the executive council, and during the succeeding 18 months he administered the affairs of the colony with much ability. He conciliated the Indians and took precautions for the military defense of the colony against Spain and France, though opposed by the Quaker members of the council. The "Kensington District" of Philadelphia was originally a portion of his farm.

Palmer, SIR **Charles Mark,** English ironmaster and shipbuilder: b. South Shields 3 Nov. 1822. He was educated for a commercial career in France; worked with his father, a shipbuilder; was partner in several coal companies; reformed the coal-carrying trade from the north of England by building screw colliers (1852), which drove the sailing brigs out of business; and at Jarrow established a great shipyard. Both iron and coal for this yard are supplied by Palmer's own mines. He introduced the use of rolled iron plates for men-of-war, held several important government contracts, was elected to the House of Commons in 1874, and is still a member. He was made a baronet in 1886.

Palmer, Edward Henry, English Oriental scholar: b. Cambridge 7 Aug. 1840; d. Arabia 11 Aug. 1882. He was educated at St. John's College, Cambridge, and later made extensive journeys of exploration in the East. In 1871 he was appointed professor of Arabic at Cambridge, and from that time onward accomplished a vast amount of literary work. In 1874 he was called to the bar. In 1882 he was engaged by the British government to assist in keeping the Arabs of the Sinai region quiet, and preventing them from interfering with the Suez Canal, when he was captured and murdered with two other Englishmen. He had a remarkable knowledge of Oriental life and language, and was a

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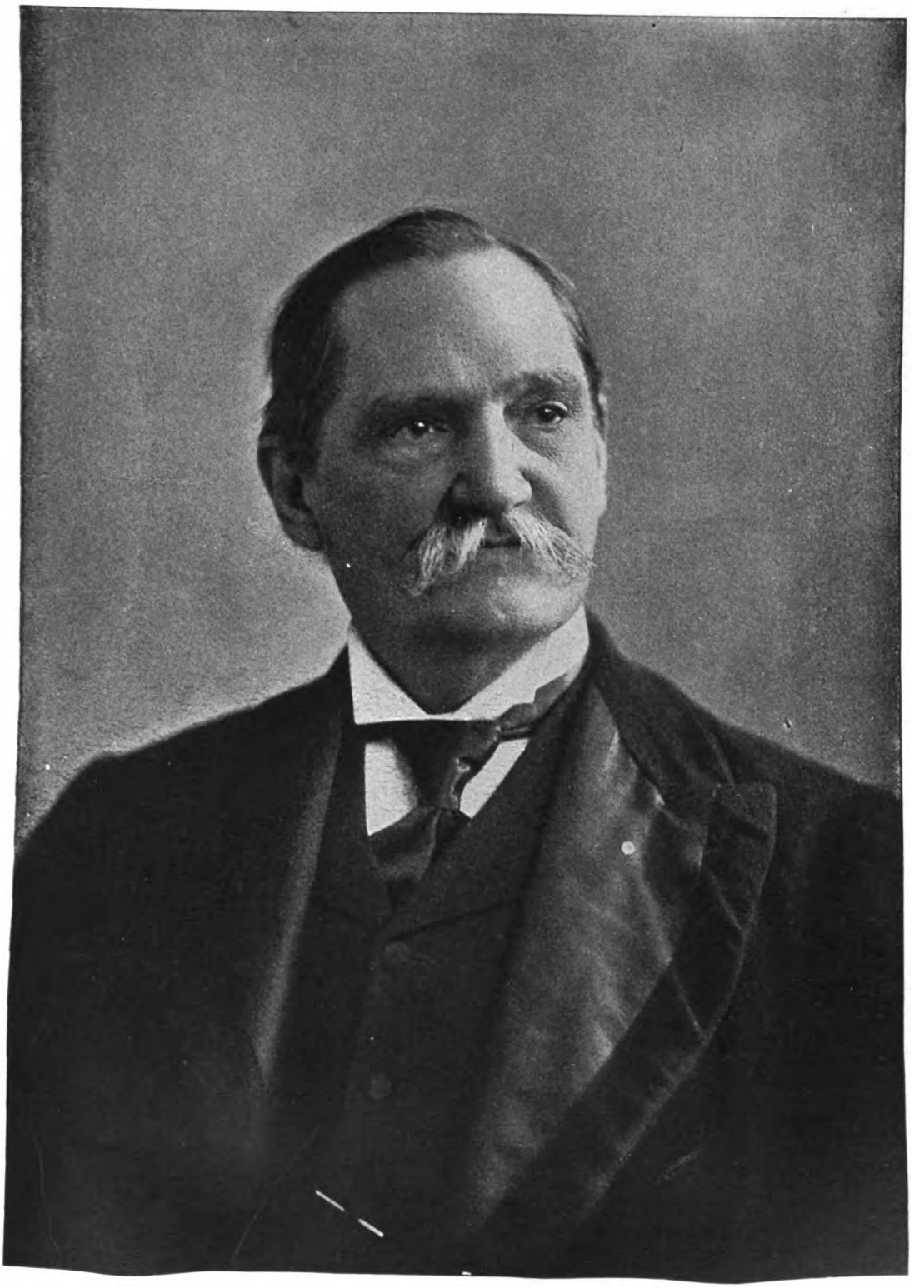

THOMAS ESTRADA PALMA,

PRESIDENT OF THE CUBAN REPUBLIC.

Non

man of very varied gifts. His works include: 'Oriental Mysticism' (1867); a 'Grammar of the Arabic Language' (1874); 'A Concise Dictionary of the Persian Language' (1876); 'The Song of the Reed' (1877), comprising Persian verse translations and original poems; 'The Poetical Works of Behá-ed-Din Zoheir of Egypt, with a Metrical English Translation, Notes, and Introduction' (1876–7); a translation of the Koran ('Sacred Books of the East,' 1880); a 'Life of Haroun Alraschid' (1881); an Arabic Manual (1881); and a 'Simplified Grammar of Hindustani, Persian, and Arabic' (1882). Consult 'Life' by Besant (1883).

Palmer, Erastus Dow, American sculptor: b. Pompey, N. Y., 3 April 1817. His best known works are 'Morning and Evening'; 'The Angel of the Sculpture'; 'The White Captive'; 'Landing of the Pilgrims' (a group of 15 life-size figures intended for the Capitol at Washington). He has also executed many portrait busts, and statues, including the statue of Robert R. Livingston in the National Capitol.

Palmer, Frederick, American journalist: b. Pleasantville, Pa., 29 Jan. 1873. He was educated at Allegheny College, Meadville, Pa., and was a London newspaper correspondent 1895–7, during the Greek war, 1897, and from the Klondike and Philippines 1897–8. He nas published 'Going to War in Greece' (1897); 'In the Klondike' (1899); 'The Ways of the Service' (1901); 'The Vagabond,' a novel (1903).

Palmer, George Herbert, American educator and classical scholar: b. Boston 19 March 1842. He was graduated from Harvard in 1864, studied at the University of Tübingen 1867–9, and at Andover Theological Seminary in 1870; and after serving as an assistant professor at Harvard 1873–83, and professor of philosophy 1883–9, became Alford professor of natural religion there in 1889, which position he still holds. He has published a much admired rhythmic prose translation of the Odyssey (1891); 'The New Education' (1887); 'The Glory of the Imperfect' (1898); 'Self Cultivation in English' (1897); 'The Antigone of Sophocles,' a translation (1899); 'The Field of Ethics' (1901).

Palmer, James Shedden, American naval officer: b. New Jersey 1810; d. St. Thomas, W. I., 7 Dec. 1867. Entering the navy in 1825 as midshipman, he was made lieutenant in 1836. In the war with Mexico he commanded the Flirt, a blockade-schooner, in 1855 became commander, and when the Civil War broke out was with the Mediterranean squadron and in command of the Iroquois. Recalled from that station, he joined the blockading fleet under Admiral Dupont. In 1862 he was promoted to a captaincy, and in the passage of the batteries at Vicksburg held the advance of the Union vessels. At New Orleans and Mobile Bay he performed important services as flag-captain to Farragut, with whom his relations were most intimate. Made commander in 1863, he rose to the rank of rear-admiral in 1866, and until his death was in command of the North Atlantic squadron.

Palmer, John McAuley, American soldier and politician: b. Eagle Creek, Scott County, Ky., 13 Sept. 1817; d. Springfield, Ill., 25 Sept. 1900. He attended Shurtleff College, Upper Alton, Ill., for a year, and later studied law and was admitted to the Illinois bar in 1839. He first entered politics in the campaign of 1840, when he actively supported Van Buren; in 1843 he was elected probate judge of Macoupin County; in 1847 was a delegate to the State constitutional convention; and in 1849 was elected county judge. In 1852 he was elected to the State senate and re-elected in 1854. His opposition to the Kansas-Nebraska bill, however, led him to sever his connection with the Democrats, and ally himself with the Republican party. He was active in the organization of this party, was president of the Republican State Convention in 1856, and delegate to the National Convention of the same year and that of 1860. He was one of the representatives of his State at the Peace Conference in Washington 1861. At the outbreak of the Civil War he joined the army as colonel of an Illinois regiment, took part in the Springfield campaign, and in December 1861 was promoted brigadier-general; in 1862 he was made major-general, in 1863 given command of the Fourteenth corps, and later of the Department of Kentucky. He took part in the operations against Island No. 10 (1862), led a division at Murfreesboro (1862) and at Chickamauga (1863); as commander of the Fourteenth corps he was engaged in the battles of Chattanooga (1863), Kenesaw Mountain and Peach Tree Creek (1864), and in the Atlanta campaign. After the war he continued his law practice in Illinois, and in 1868 was elected governor of the State; during his administration he steadily resisted special legislation and the granting of special privileges. In 1872 he left the Republican party and supported Greeley for the presidency, and in 1876 was one of the most active supporters of Tilden. In 1890 he was nominated for United States senator by the Democrats, and elected, serving for six years. In 1896 he was nominated for the presidency by the Gold Democrats who refused to accept the regular nominations on account of the free silver plank of the platform. He wrote his autobiography, published under the title 'Personal Recollections of John M. Palmer.'

Palmer, John Williamson, American author: b. Baltimore, Md., 4 April 1825. He was graduated from the University of Maryland as a physician in 1847 and was city physician in Baltimore 1849–50. In 1870 he removed to New York, and subsequently was connected with the staff of the Century and Standard dictionaries. Among his publications are: 'The Golden Dragon; or, Up and Down the Irrawaddi' (1853); 'The New and the Old; or, California and India in Romantic Aspects' (1859); 'After His Kind,' a novel (1886); 'The Poetry of Compliment and Courtship' (1867); 'For Charlie's Sake and Other Lyrics and Ballads' (1901); and 'Stonewall Jackson's Way,' one of the most popular ballads of the Civil War.

Palmer, Nathaniel Brown, American sea-captain: b. Stonington, Conn., 1799; d. 1877. He went to sea at 14 and in 1821 he commanded the sloop Hero which set sail from Yankee Harbor in South Shetlands on an exploring expedition. He discovered the land known as the Palmer Archipelago, which at the time was supposed to be a portion of the Antarctic continent. He followed a seafaring life until 1849 and was

afterward a director of the Fall River line of steamers.

Palmer, Ray, American Congregational clergyman and hymnologist: b. Little Compton, R. I., 12 Nov. 1808; d. Newark, N. J., 29 March 1887. He was graduated at Yale in 1830; studied theology and entered the Congregational ministry. He was pastor of churches at Bath, Maine, 1835–50, and Albany, N. Y., 1850–66; and secretary of the Congregational Union in New York city 1866–78. He was the author of many sacred poems, of which the best known is the hymn 'My Faith Looks Up to Thee.' included in very many collections of church hymns and translated into more than 20 languages. His published volumes are: 'Hymns and Sacred Pieces' (1865); 'Hymns of My Holy Hours' (1868); 'Voices of Hope and Gladness' (1880).

Palmer, Samuel, English painter: b. Newington, Lancashire, 27 Jan. 1805; d. Reidgate, Kent, 24 May 1881. He was a pupil in the antique school of the British Museum, and received some inspiration from his acquaintance with William Blake. His studies were for two years continued at Rome (1837–9) after which he devoted himself to water colors and became a member of the Water Color Society in 1854. While belonging to the ideal school of Turner and Wilson he confined himself entirely to water color and etching, in both of which departments he reached the highest excellence. Among his best-known pictures which are suffused with profound poetic feeling are: 'Dream on the Apennines' (1864); 'Curfew' (1870); and 'The Waters Murmuring' (1877). His finest etchings include: 'The Sleeping Shepherd'; 'The Skylark'; 'The Lonely Tower.' He translated the eclogues of Virgil and intended to illustrate them, but only lived long enough to complete one plate, 'The Opening of the Fold.'

Palmer, Walter Launt, American painter: b. Albany, N. Y., 1854. After studying under F. S. Church at Hudson, N. Y., he became the pupil of Carolus Duran at Paris and developed great skill in landscape painting. He was awarded a gold medal at the World's Columbian Exposition in 1893 and honorable mention at the Paris Exposition of 1900. His Venetian scenes and snowy landscapes are remarkably effective and among his best productions are 'Venice' (1882); 'January' (1887); 'Domes of La Salute'; 'End of a Winter Day'; and 'Under the Pines' (1896). He is a member of the National Academy and of the Society of American Artists.

Palmer, a term in mediæval times applied to a pilgrim who had visited the Holy Land and carried on his return a branch of the palm for a staff as a memorial of his journey. The name was also given to pilgrims who wandered from shrine to shrine without a fixed home, probably because many of the pilgrims who had been to Jerusalem were in the habit of doing so.

Palmer, Mass., town, Hampden County; on the Chicopee, Swift and Ware rivers, and on the Boston & A., and Central V. R.R.'s; 14 miles east of Springfield. It includes the villages of Palmer, Three Rivers, Bondsville, Thorndike, and Duckville, of which the first two are the most important. It was first settled in 1716 by John Kingston, and was incorporated as a town in 1775; for several years previous to its incorporation (1741–52) it was called Kingston. It is an enterprising industrial town and manufactures cotton and woolen goods, carpets, wire, wire nails, hats, etc. It has a public and an association library. Pop. (1890) 6,520; (1900) 7,801. Consult: Temple, 'History of the Town of Palmer, Massachusetts.'

Palmerin (păl'mĕr ĭn) **of England** (PALMERIN DE INGLATERRA), a romance of chivalry in the style of 'Amadis of Gaul,' and in this class of literature regarded as second only to it in point of merit. It is this book, which, with 'Amadis,' Cervantes saves from the holocaust in 'Don Quixote.' It was long supposed to be the work of Francisco Moraes, a Portuguese, who published it in 1567 as a translation from the French, and in 1807 Southey published an English translation, attributing the original to Moraes, and credited him with modesty in not claiming the authorship. It has since been found to have been the work of Leon Hurtado, and to have been published originally in Spanish, in Toledo, in 1547. This story is in some respects a continuation of 'Palmerin de Oliva' (q.v.).

Palmerin de Oliva, päl-mä-rēn' dā ō-lē'vā, a romance of chivalry, a feeble imitation of 'Amadis of Gaul,' first published in Salamanca in 1511. It has generally been considered to be of Portuguese origin; but Ticknor, in his 'History of Spanish Literature,' asserts that the author of it was a carpenter's daughter in Burgos. This is one of the books against which Cervantes inveighs as responsible for the mental condition of Don Quixote; and in the famous scene of the burning of the books of chivalry, he says: "This Oliva, let it be hewn in pieces and burnt, and let not the very ashes be left." A continuation by the same author, 'The Second Book of Palmerin,' which treats of the adventures of his sons, Primaleon and Polendos, appeared later.

Palmerston, päm'ẽr-stŏn, **Henry John Temple,** VISCOUNT, English statesman: b. Romsey, Hampshire, 20 Oct. 1784; d. Brockett Hall, Hatfield, Hertfordshire, 18 Oct. 1865. He was educated at Edinburgh University and at St. John's College, Cambridge University, being graduated from the latter in 1806. In 1806 and 1807 he was the Tory candidate for member of Parliament from Cambridge University, and was both times defeated, but in 1807 was elected to Parliament from Newtown, Isle of Wight. In 1809 he succeeded Lord Castlereagh as secretary at war, and in 1811 was elected member of Parliament for Cambridge University. As secretary of war he carried out a vigorous reform of the details of administration; regulated the finances, paid off arrears, and reduced the previous confusion of the war office to order. He mainly confined himself in his parliamentary speeches to the business of his department, but also spoke on Catholic Emancipation, of which he was always a supporter. He retired from office in the Wellington ministry in 1828 with others of the Canning party. In 1830 he became foreign secretary in the Whig ministry of Earl Grey, and from this time continued a member and leader of the Whig party. In 1831 he lost his seat for Cambridge, but was elected to Parliament from Bletchingley, then from South

Hants, and in 1835 from Tiverton, which borough he continued to represent till his death. It was during his service as foreign secretary that he earned a reputation for vigilance and energy in the conduct of foreign affairs, and especially for guarding the interests of individual Britons abroad, which, while it increased his popularity at home, gained him enemies abroad. He succeeded in establishing and maintaining friendly relations with France so that the two nations acted in concert; took a leading part in gaining the independence of Belgium, and in establishing constitutional government in Spain and Portugal. He supported Austria and Turkey against Russia, in the East, and took part in the war against Mehemet Ali. In Parliament he supported the liberal policy of free trade and labor laws regulating hours, factory conditions, etc. He was foreign secretary till 1841, when the Whig ministry went out of office on the question of free trade in corn, but on the Whigs' return to power in 1846 he again took that office, under Lord Russell. During the period of 1848–9 he manifested his liberal tendencies and sympathy with the revolutionary party without active interference with the affairs of foreign states. Several of his acts in this administration aroused party criticism, especially his favoring the cause of a Portuguese Jew at Athens, Don Pacifico, a naturalized British subject, which caused a quarrel with Greece, and nearly produced a war with France. This was the occasion of a keen discussion of his policy in Parliament, which resulted in a formal vote in the House of Commons approving the foreign policy of the government. In 1851 he unofficially expressed to the French ambassador in London his approbation of the *coup d'état* of Louis Napoleon, without consulting either his colleagues or the Queen, and he was forced to resign. In the next year he defeated the Russell ministry on the question of the Militia Bill, but refused to accept a position in the cabinet under Lord Derby. In December 1852 he took office as home secretary in the coalition ministry of the Earl of Aberdeen, and on the resignation of this ministry, in consequence of alleged mismanagement of the Crimean war, he was on the almost universal demand of the country called to the premiership, and vigorously carried on the war with Russia. In 1857 Parliament, on the motion of Richard Cobden, passed a vote of censure on the conduct of the Chinese war; dissolution of the house gave Palmerston a majority, but in February 1858 he resigned, after being defeated on the Conspiracy Bill; he returned to power in June 1859, and continued to hold the premiership during the remainder of his life.

Among the important events of his administration were the American Civil War (with the recognition of the Confederate States as belligerents and the Alabama incident), the Prussian war against Denmark, which he opposed, and the union of Italy, which he strongly favored.

Consult: Dalling, 'Life of Lord Palmerston' (continued by Sir Evelyn Ashley); Francis, 'Opinions and Policy of Viscount Palmerston' (1852); Lorne, 'Biography of Lord Palmerston' (1891); Sanders, 'Life of Viscount Palmerston' (1888); and Trollope, 'Life of Lord Palmerston' (1882).

Palmet'to. See PALMS.

Palmetto Ranch, Engagement at, the last engagement of the Civil War. On the evening of 11 May 1865 Col. T. H. Barrett, 62d United States colored infantry, in command at Brazos Santiago, Texas, sent Lieut.-Col. Bronson, with 300 men, to attack some Confederates on the Rio Grande, who were procuring horses to remount their cavalry. Marching by night, Bronson, early next morning, attacked about 200 Confederates at Palmetto Ranch, on the Rio Grande, seizing their camp and taking some prisoners, horses, and cattle. Bronson then fell back to White's Ranch, where he was joined on the morning of the 13th by Col. Barrett, with about 200 men of the 34th Indiana, under Lieut.-Col. Morrison. Barrett advanced in the direction of Palmetto Ranch, which the Confederates had reoccupied. He was met by cavalry, which was easily driven back; Palmetto Ranch was reached, the buildings and public stores burned, and after following the Confederates some distance Barrett retired to a hill about a mile from Palmetto Ranch where, about 4 P.M. he was attacked by Gen. J. E. Slaughter, with 675 men and six guns. The infantry and four guns attacked in front, while about 250 cavalry and two guns, under cover of a chaparral, flanked him and endeavored to gain his rear. Barrett had no artillery, and fell back fighting. About 50 men of the 34th Indiana were cut off and captured. The retreat was covered by a part of the 62d colored infantry, deployed as skirmishers, who resisted every effort of the Confederate cavalry to break the line, repelling several determined attacks. The running fight continued about three hours and then, at sunset, Confederate pursuit ended. Col. Barrett reports: "The last volley of the war, it is believed, was fired by the 62d United States colored infantry, about sunset of the 13th May 1865, between White's Ranch and the Boca Chica, Texas. The Union loss in the expedition was 115 killed, wounded, and missing. The Confederate loss is not known. Consult: 'Official Records,' Vol. XLVIII.; Lossing, 'History of the Civil War,' Vol. III.

E. A. CARMAN.

Palmetto State, a name applied to South Carolina. The palmetto tree appears on the coat of arms of the State. See SOUTH CAROLINA.

Palmistry, or **Chiromancy,** is the art of "reading the palm"— the art which professes to discover the temperament and character of any one, as well as the past and future events of his life, from an examination of the palm of his hand, and of the lines traced upon it. As a considerable body of very complicated rules and directions have been laid down by authorities, ancient and modern, to enable the student to read the palm, palmistry claims to be regarded as a "science," or at least as a branch of an interpretative science of the hand in general, to which the name *Chirosophy* has been given. The other branch of this general science has been called *Chirognomy,* and is concerned with the interpretation of the form and character of the hand and fingers, while Chiromancy treats of the palm only. The science was known to the ancient Greeks and was somewhat popular on the continent during the Middle Ages. The chief authorities on palmistry in recent times are two Frenchmen, M. le Capitain D'Ar-

pentigny, and M. Adrien Desbarrolles; and it is on their works that modern English books on the subject are chiefly founded. The observation of the fingers and joints on the hand is quite as important to the chiromant as that of the palm itself. The thumb is generally regarded as chirognomically the most important part of the hand. The first, or upper phalange of the thumb, when well developed, shows the presence of will and decision of character; the second, according to its development, indicates more or less logical power. What has to be considered by the chiromant proper is the "mounts" of the hand, with the marks on them, and the lines in the palm. The "mounts" are the elevations at the base of the fingers and thumb and in the "percussion" of the hand — that is, the side of the palm which extends from the root of the little finger to the wrist; it is so called because it is used in striking. They are seven in number, and are named from the planets. When well developed the mounts indicate the possession of the quality associated with the respective planets — for example, Jupiter developed denotes pride and ambition; Saturn, fatality; Apollo, art or riches; Mercury, science or wit; Mars, courage or cruelty; Venus, love and melody; the Moon, folly or imagination. But the effect of a greatly developed mount may be modified by the lines in the palm or by other signs. There are four principal lines, namely, the line of life, which surrounds the thumb, and which, if long, indicates a long life; the line of head, the line of heart, and the rascette or the bracelets. These last (the bracelets), if well marked, strengthen the effect of the line of life, each bracelet indicating thirty years of life. The line of heart, if long, clear cut, and well colored, denotes an affectionate and devoted character; and the nearer the line stretches to Jupiter the better the character. If the line end in a fork, so much the better. In actors and mimics this line ascends the mount of Mercury. A good line of head — that is, a clear-cut, long, unbroken line — indicates the presence of superior intellectual qualities. If the line stretch to the mount of the Moon, it indicates imagination. A winding headline shows folly and indecision of character; a linked line (like a chain) denotes want of concentration. The other lines (which are not present in all hands) are the line of Saturn or fate, the line of Apollo, the line of liver or health, and the line of Venus. A long, clear-cut line of Saturn foretells a happy and prosperous life, breaks or windings in the line foretell misfortunes or obstacles; a good line of Apollo shows that its owner will be successful in art; a good liver-line promises a long and healthy life; while the Venus line, when present, indicates a character very liable to be influenced by the passion of love. Marks on the mounts or lines, such as stars, crosses, etc., have their respective significations. A good open space between the lines of head and heart (the quadrangle) indicates a generous and noble disposition, while a very narrow space in the quadrangle is a sign of avarice and egotism.

Palmitin, or **Tri-palmitin,** a fatty substance occurring quite commonly in the natural fats and organic oils, and closely analogous to stearin in its chemical structure and deportment. It is especially abundant in palm oil, from which circumstance it derives its name. Tri-palmitin may be conveniently prepared from palm oil by expelling the liquid portion by pressure, washing the solid residue with boiling alcohol to remove such other fats as it may still retain, and finally crystallizing from a solution in ether. By this process it is obtained in the form of white crystals which are scarcely soluble in alcohol but readily soluble in ether, and which melt at 144° F. Varieties of tri-palmitin are said to exist, however, which melt at 115° F. Chemically, tri-palmitin is a compound of palmitic acid, $C_{15}H_{31}.COOH$, with glycerin, $C_3H_5(OH)_3$; three molecules of the acid being combined with one of the glycerin, as indicated by the equation $3C_{15}H_{31}.COOH + C_3H_5(OH)_3 = 3H_2O + C_3H_5(C_{15}H_{31}.COO)_3$, the last formula on the right hand side of the equality sign being that of tri-palmitin. Two other compounds of palmitic acid with glycerin are also known, but they are of less importance. Mono-palmitin has the formula $C_3H_5(OH)_2(C_{15}H_{31}.COO)$, and melts at about 140° F. It may be distilled in a vacuum, but when heated in the air it breaks up with the formation of acrolein and other products. Di-palmitin has the formula $C_3H_5(OH)(C_{15}H_{31}.COO)_2$, and its melting point is given, by various authorities, at from 125° F. to 140° F. When a mixture of glycerin and palmitic acid is heated for 24 hours at 400° F., all three of the palmitins are formed; and when the product is shaken with lime water and then extracted with ether, and the ethereal solution is evaporated, tri-palmitin, di-palmitin and mono-palmitin separate out in the order named. The palmitins are readily saponified by heating with caustic alkalies, and free palmitic acid may be conveniently prepared by adding hydrochloric acid to an aqueous solution of potassium palmitate.

Palms, trees, or shrubs of the monocotyledonous family *Palmæ,* ranking in economic importance next to the grasses. The species, of which about 1,000 are recognized, belong to about 130 genera. The great majority of these genera consist of only a few species, in many cases of only one. *Calamus* (the rattan palms) is the largest genus, consisting of about 200 mostly Asiatic species with no representatives in the Western hemisphere. *Geonoma* and *Bactris,* American genera, each contain about 100 species. The fourth, an American genus, is *Chamædorea* with about 60 species. The Asiatic and Australasian genus, *Licuala,* contains about 30 species. *Cocos,* an American genus with the exception of the cocoanut, which is cosmopolitan within the tropics, also contains about 30 species. *Desmonicus* (American), *Pinanga* and *Areca* (Oriental) each contain about 25 species. Geologists and botanists are fairly well agreed that the palms represent a once more extensively distributed and more numerous group of plants and that they are now upon the decline. Fossil remains are preserved in the rocks of the Middle Cretaceous, and, in North America, in those of the Upper Cretaceous from Greenland southward; in both Europe and North America they are also found in the Tertiary rocks.

With few exceptions the individual genera and even the tribes which they comprise are restricted in their distribution; certain tribes are African, other Asiatic or American, etc., and certain genera are found in very small areas; for instance, *Pseudophœnix sargenti* is found only in certain of the Florida Keys and even

there in limited numbers, and the species of *Howea* only in Lord Howe's Island, a tiny speck of land in the Southern Pacific Ocean. Only one species (*Chamærops humilis*) is an acknowledged native of Europe. The most noted exception to this rule is the cocoanut palm (*Cocos nucifera*) which appears throughout the tropics upon maritime land. It is among the first plants to obtain a root-hold upon newly formed islands. As a group, the palms are almost restricted to tropical and subtropical countries; the European species mentioned, however, extends as far north as latitude 44; an American species, the palmetto (*Sabal palmetto*), to 35; some Asiatic species to 34. In the Southern hemisphere some American species reach latitude 36 S., some African 30 S. In Australia, latitude 35 S. is the limit; but in New Zealand one species reaches 38 S. There are, however, a few South American species which approach the perpetual snow line upon the mountains. With respect to habitat, the various species exhibit a wide range of adaptability, some, like the cocoanut, growing only upon the sea coast, others wholly inland; some in sand, others in rich alluvial soils; some in swamps, others on dry hillsides; some in exposed places, others in the depths of the forest; some solitary, some in groups, some in forests or jungles to the exclusion of other species of trees.

In general, palms are erect, unbranched trees with buttressed bases. They often attain heights of 100 feet and at the summits of the usually smooth or slightly ringed columns, they bear a rosette of large leaves, each of which resembles in some kinds a fan and in others a feather. In some species of the former type the leaves may exceed 40 feet in length and six feet in breadth; in the latter, 20 feet by four or more, without division. There are, however, exceptions to the ordinary columnar habit of growth; a few species are branching; some are low growing, even creeping; others are slender stemmed plants which climb by means of hooked spines; some have flexible stems which extend from tree to tree in festoons and attain several hundred feet, 500 feet being common, and some writers placing the length at 1,500 and even more. In the ordinary species the flowers are borne in huge clusters which appear from within spathes that open in some cases with a report. The fruits are of various kinds, berries and drupes being perhaps most common. They are often enclosed in a fibrous husk, and frequently contain a hard nut. The flowers, which are generally small and individually inconspicuous, bear no relation in size to the fruit, which may be as small as a pea or, as in the double cocoanut, larger than a man's head.

While the grasses are of widest economic importance among plants, the palms are employed for the largest number of purposes. All parts of the various species are used, but in few do more than two or three parts find extensive employment. Many palms furnish good fuel, some useful timber, others masts and spars. The pith of certain species, especially of *Metroxylon* and *Caryota*, supply sago. The thin, pliant stems of many species of *Calamus*, known commercially as rattan, are widely used throughout the world for wickerwork and furniture. The terminal bud of several kinds is cooked and eaten like cabbage, such species being known as "cabbage palms"— for instance, *Euterpe oleracea*. The leaves serve for thatching houses, and as material for walls, mats, screens, shields, clothing, hats, bedding, cordage, twine, nets, etc. The spines of certain species are used for tipping arrows and spears, for tattooing, for fish-hooks, etc. The fibre of the leaves of many species seems to offer useful paper-stock; that of others, for example, the piassaba fibre (q.v.), derived from various species of *Attalea* (especially *A. funifera*) is extensively used for brushes of various kinds, ranging from hair-brushes to stable brooms and street-cleaning machines. The sap of several species is used for the manufacture of palm-wine and of arrack, the latter a spirituous liquor; it is also employed in making jaggery, a kind of sugar of some commercial importance. For this latter purpose *Phœnix sylvestris* is perhaps the principal species. In some cases the sap is obtained by tapping; in others by cutting the terminal bud or even the trunk near the base.

The fruits of many species are useful. As food the cocoanut and the date are probably the most widely known and important. The former is employed not only as a fruit, but its contained liquid or "milk" furnishes a palatable drink either fresh or prepared as a wine. The kernel supplies the "shredded cocoanut" employed in confectionery, cakes and puddings. It also yields cocoanut butter or oil. The fibre of the husk is widely used for matting and is very popular where great durability is essential, as upon the aisles of public halls. The shells make serviceable dippers, bowls, and other utensils, or when carved and polished, attractive ornaments. The date palm supplies the Arab and other peoples of northern Africa and southern Asia with one of their chief foods, for which purpose it is commonly seen near dwellings, besides being planted extensively for commercial purposes. The chief commercial supplies come from Arabia, Persia and Mediterranean Africa.

Oils are obtained from the fruits of a large number of species, especially *Elæis guineensis*. Some of these oils are used for food, others for lubricating; some for illuminating; and others for soap and candle making. Usually these oils are orange-colored, violet-scented, and sweetish. They are generally obtained by boiling the ripe fruits in water, though also frequently by expression. Like butter, they soon become rancid unless kept cold. Palm butter is a popular name for several of the kinds. A palm wax is secured from species of *Copernicia*, and is used like beeswax.

The seeds of many species are very hard and are used for manufacturing small ornamental and useful articles such as knife handles, collar buttons, etc. Probably the best known of these is the so-called "vegetable ivory" (q.v.) which is derived from the *Phytelephas macrocarpa*, a South American species with a short or even creeping stem, from which arise pinnate leaves often more than 15 feet long. The seeds of *Areca catechu* are mixed with lime and pepper leaves to make the notorious "betelnut" (see BETEL) of eastern Asia. The product is used as a stimulant.

The most remarkable palm of all is perhaps the palmyra, deleb or borassus palm (*Borassus flabellifer*). This species is a native of southern Asia, the Australasian Archipelago and western

Africa, where it sometimes exceeds 100 feet in height. The leaves, which often exceed three feet in length, have spiny-margined petioles; the triangular fruits are about five inches in diameter, have a brownish or black, glossy, succulent, fibrous rind, and contain three seeds about as large as goose-eggs. Throughout India this is the commonest palm, and in Ceylon it occurs in extensive forests. It is employed for more purposes than perhaps any other plant, upward of 800 uses being recorded for its various parts. Its wood, palmyra wood, is heavy, dark, hard, durable, easily polished, difficult to cut across the grain but easy to cut with the grain. It is used for house-building, furniture, etc. The wood of some other palms is also known by this name and as porcupine-wood. The leaf stalks make excellent fences. The leaves are employed for thatch, mats, umbrellas, fans, hats, baskets, as writing tablets, for ropes, twine, etc.; the down at the leaf-bases for lint, and for filtering liquids; the sap yields sugar, palm wine and arrack; the fruit is cooked as an esculent; the young seeds are similarly employed, and the young plants serve as pot-herbs. A large part of the population of southern India depends upon this plant to supply its needs — fuel, shelter, clothing, food, etc.

Among the most important palms the following with their chief uses may be mentioned: Assai or Para palm (*Euterpe edulis*), a South American species whose fruits are macerated in water to make a popular drink called assai; Bourbon palm, one of the most widely grown of greenhouse and house palms, usually called *Latania borbonica* by florists, but properly *Latania commersonii;* double Seychelles, or sea-cocoanut palm (*Lodoicea callipyge*), chiefly noted for its great size, slow growth, enormous seeds weighing more than 10 pounds (even, it is said, more than 30 pounds), which from their seeming malformation but more particularly from their formerly unknown origin, gave rise to numerous fabulous tales; curly palm (*Howea belmoriana*) one of the best known greenhouse palms, and popularly called *Kentia belmoriana;* fan-palm, any species with fan-like leaves; fern-palm (*Cycas revoluta,* etc.), commonly raised in greenhouses; fish-tail, wine, or toddy palm (*Caryota urens*), a source of jaggery, arrack and palm wine; flat palm (*Howea fosteriana*), a favorite greenhouse palm popularly known as *Kentia fosteriana;* raphia palm (*Raphia*), which furnishes the raphia used by florists and nurserymen for tying up plants; Royal palm (*Oreodoxa regia*), so named in expression of its majestic appearance, and one of the most popular avenue-palms of warm countries; umbrella palm (*Hedyscope canterburiana*); walking-stick palm (*Bacularia monostachya*); wine palm (*Caryota urens; Phœnix sylvestris; Borassus flabelliformis,* and *Cocos butyracea*); gomuto or areng palm (*Arenga saccharifera*), which furnishes fibre used for cordage, canvas, etc., and sugar, wine, vinegar, etc.; inaja palm (*Maximiliana regia*), the spathes of which are used as baskets and as cooking utensils; doum palm (*Hyphœna thebaica*), one of the few branching palms; talipot palm (*Corypha umbraculifera*), noted for its prodigious fertility in flowers, the number of blossoms upon a single tree having been estimated at 60,000,000, the inflorescence attaining a height of 30 feet above the crown of leaves. The "palm" of the Bible is believed to be the date-palm, which is one of the commonest species in Syria at the present time. The so-called Panama-hat palm (*Carludovica palmata*) is not a palm botanically, but a member of the order *Cyclanthaceæ.*

With the exception of the date and the cocoanut, palms are little cultivated, the wild species being relied upon for commercial purposes. Even these species and those used for sugar, arrack, etc., are usually planted in favorable situations and allowed to shift for themselves after once becoming established or even before. For ornamental purposes, however, more or less care is given the young trees used in warm climates for bordering avenues, and as lawn or garden specimens.

During the closing decade of the 19th century palms sprang into popularity as greenhouse and house plants, for which purposes, and for decorating halls, churches, hotels, lobbies, etc., about a dozen species have become deservedly popular, not only because of their graceful appearance, but because of their ease of cultivation. Many other species are also found in private conservatories. In the United States the chief centre of palm production for these purposes is the Middle Western States, but the South is also increasing its area devoted to ornamental palms. The plants are nearly all grown from imported seeds sown in warm greenhouses. In some cases the seeds require months or even more than a year to germinate; but usually a month or two is sufficient. In many cases the young seedlings resemble one another, whether they will develop into pinnate-leaved or fan-leaved specimens. At all times ample water and good drainage are essential; shading is also generally beneficial. The plants generally succeed best in well rotted sod obtained from rather light soil rich in humus. Scale-insects and the red spider are the chief enemies; the former may be controlled with kerosene emulsion (see FUNGICIDE); the latter by forcible spraying, moist atmosphere, and by evaporated (not burned) sulphur. The fumes of burning sulphur are fatal to the plants.

Consult: Bailey, 'Cyclopedia of American Horticulture' (New York, 1900–2); Martius, 'Historia Naturalis Palmarum' (Munich, 1823–50); Kerchove de Denterghem, 'Les Palmiers' (Paris, 1878).

M. G. KAINS,
Crop Expert.

Palmyra, păl-mī'ra, Asiatic Turkey, the Hebrew *Tadmor,* City of Palms, an ancient city of Syria, now in ruins, 140 miles east-northeast of Damascus, lat. 34° 24′ N., lon. 38° 20′ E. It was founded or enlarged by Solomon in the 10th century B.C. It is situated in an oasis of the Syrian Desert, with a ridge of hills to the west, and an extensive plain on the east. It is said to have been a bulwark of the kingdom of Israel against the wandering tribes of the desert, and was an entrepôt for the trade between Damascus and the Mediterranean, from which it drew considerable wealth. Palmyra was little heard of in history until the time of the Roman Empire. It is mentioned as having been attacked by Mark Antony, who hoped to find in it the means to pay his troops; but the Palmyrians transported their goods beyond the Euphrates, and he was compelled to leave without accom-

plishing his object. During the earlier period of the empire it was independent, and carried on a considerable trade with Persia, India, and the Mediterranean. Subsequently, about 130, or according to other authorities later, it submitted to Rome, and became a Roman colony. The protection of Rome against its neighbors, the Parthians and the Persians, was of value, while the yoke of so distant a mistress was not heavy. It became the faithful ally of Rome in her wars against the Eastern powers. During the reign of Gallienus (260–8), Odenathus, the ruler of Palmyra, rendered such effectual assistance against the Persians that that emperor gave him the title of Augustus, and recognized him as his colleague. Odenathus was succeeded by his widow Zenobia, to whom Palmyra chiefly owes its fame, and who took the title of Queen of the East. She was besieged in Palmyra by Aurelian, and compelled to surrender. On his departure the Palmyrians revolted, on which Aurelian returned and destroyed the city (273 A.D.). He permitted the inhabitants to rebuild it, but it never recovered its importance. The remains of Palmyra are chiefly of the Corinthian order, with the exception of the Temple of the Sun, which is Ionic. They are supposed to belong to the period of Odenathus and Zenobia. See ZENOBIA. Consult Wright, 'An Account of Palmyra and Zenobia' (1895).

Palmyra, Mo., city, county-seat of Marion County; on branches of the Chicago, B. & Q. railroad; about 14 miles northwest of Hannibal. It was settled in 1818, laid out in 1819, and incorporated in 1855. It is in a farming country and the chief manufactures are connected with farm products. It has a pickle factory, creamery, flour and grist mill, and a carriage factory. The educational institutions are Centenary High School (M. E. South), founded in 1884, and the Saint Paul's College (P. E.), founded in 1848 as the Ingleside Female College, and public and parish schools. Pop. (1890) 2,515; (1900) 2,323.

Palmyra Fibre. See FIBRE.

Palmyra Wood. See PALM.

Palni (päl'nē) **Hills,** mountain range of Southern India, joining the Eastern and Western Ghats, in the district of Madura, Madras presidency. The soil is fairly fertile and affords excellent pasturage. The climate is equable, comparatively dry and healthy, and there is a sanatorium at Kodikanal, 47 miles northeast of Madura.

Palo, pä'lō, Philippines, a pueblo of the island of Leyte, situated on the northeast coast at the mouth of the Malo Malo River, six miles south of Tacloban. It is an important road centre, being connected by road with Tacloban and other important towns to the south and west. Pop. 17,740.

Palo Alto, pä'lō āl'tō, Cal., town in Santa Clara County; on the coast division of the Southern Pacific railroad; 33 miles southeast of San Francisco and 18 miles northwest of San Jose. It was settled in 1891 by the opening of the Leland Stanford Jr. University (q.v.) which is located here. In 1892 a number of people established homes in Palo Alto on account of the university. It was incorporated in 1894. Palo Alto is a «university town,» with but few industrial establishments. The planing mills have about 30 employees; and there are stores sufficient to supply a limited amount of the local needs. There are eight churches, a high school, elementary graded schools, Manzanita Hall, a preparatory school for boys, and two preparatory schools for girls. The one bank has a capital of $100,000. The town is governed by a board of five trustees. The town owns the water and electric-light plants and has a good sewerage system. Pop. (1900) 1,658, not including students.

Palo Alto, Texas, the name of a plain, or field, eight miles northeast of Brownsville (q.v.), Cameron County, where was fought, 8 May 1846, the first important battle of the war between the United States and Mexico. General Taylor with 2,000 U. S. troops was on the Rio Grande opposite Matamoros; and General Arista with a force of 6,000 Mexicans tried to cut him off from Point Isabel which was the base of U. S. supplies. Taylor attacked and defeated Arista; the Mexicans retreated to Resaca de la Palma (q.v.). The United States loss was four killed and 126 wounded; the Mexicans, 102 killed and 128 wounded. Consult: Howard, 'General Taylor' (1892); Bancroft, 'History of Mexico,' Vol. V.

Palo'lo, an annelid (of the genus *Eunice viridis*) found in great abundance in the sea near the coral reefs of tropical islands. They are taken in large numbers in autumn in nets by the islanders, who esteem them, when roasted, as a great delicacy. The body, about a foot long on the average, tapers toward both ends, and along each side are tufts of gills. An American species (*E. fucata*) abounds in various parts of the West Indies and Gulf of Mexico, but is not eaten.

These worms are interesting mainly on account of their extraordinary breeding habits. During the most of the year the worms lie coiled up in burrows in rotten coral-rock, or other friable material. When the eggs have ripened within the body, and the time for their discharge has come (which happens in early November in the South Pacific, and in July in the West Indies), the hinder part of the worm, which contains the ovaries and sexual organs, creeps backward out of the burrow, and struggles to get away, while the forward vital part holds on to its burrow. This takes place simultaneously with all the millions of worms in a district. After a little struggle the posterior part breaks away and swims with great rapidity to the surface, vast swarms rushing together to the top, where they are devoured by fishes and birds, and in the South Seas are netted by men, women, and children, by the thousand. Almost at once each worm bursts, discharging the eggs in a shower, and when all are gone the worm ceases its backward flight, collapses and dies. On no other occasion is the worm seen to leave its submarine burrow.

Palos, pä-lōs', Spain, a former important seaport town of Andalusia, in the province and 10 miles southeast of Huelva, on the left bank of the Rio Tinto, near the Gulf of Cadiz, where Columbus fitted out his ships, and whence he sailed on his first voyage for the discovery of the New World in 1492. The convent at the gate of which Columbus appeared as a poor stranger, and asked bread and water for his

child, is still standing here. Palos is now an unimportant village. Pop. (1900) 1,619.

Pal'pi, the organs or appendages, consisting of stalked or jointed processes, found in connection with the mouth of many invertebrate animals, and which appear to be chiefly devoted to the exercise of the sense of touch, the means by which the animal explores the surface upon which it walks, and probably in some cases of taste also. Thus, in many insects palpi are borne by the "maxillæ" or lesser pair of jaws (*maxillary palpi*), and by the "labium" or lower lip (*labial palpi*). The labial palpi in butterflies form the cushion-like organs by which the elongated proboscis or tongue is protected when at rest; and the small maxillary palpi of these insects are sometimes known as *palpuli*. In bees, etc., the labial palpi are of great relative length. In *Arachnida* (spiders, scorpions, mites, etc.) the maxillary palpi are largely developed. In the spiders these organs in the males are concerned in reproduction, and in the females they are terminated by hooked claws. In the scorpion the same structure forms powerful nipping-claws or *chelæ*. In the higher crustaceans (lobsters, crabs, etc.) certain of the jaws bear palpi. Consult Packard, 'Zoology' (1897).

Palpita'tion, abnormal movement or beating of the heart, sometimes violent and spasmodic; sensible to the patient, and causing discomfort or even distress. Its immediate cause is an over-stimulation of the excitability of the muscular structures of the heart, due to disturbed action of the ganglia and nerves which control its movements. The predisposing and exciting causes of palpitation are numerous; for example, an excitable temperament; bodily and mental exhaustion; inanition; deterioration of the blood as in scurvy, chlorosis, and spanæmia; violent exercise or emotion; mental shock; dissipation; dyspepsia. In short, whatever tends to disturb the orderly action of the nervous system may induce palpitation, which is sometimes accompanied by symptoms of choking (*globus hystericus*), vertigo, ringing in the ears, impaired vision, partial unconsciousness, a clammy coldness of the extremities, and the fear of death, due to general nervous agitation. When palpitation arises from actual or organic disease of the heart it is sometimes spoken of as symptomatic; when due merely to disturbed action of the heart or to disorders elsewhere it is frequently called functional, though it is always but a symptom. When occurring with organic disease it often causes more anxiety to the patient than the disease itself. In treatment, remove as far as possible the exciting cause, enjoin absolute rest, keep the feet warm, sometimes give hot drinks — milk, cocoa, and hot water containing a little baking-soda are useful. Valerian and aromatic spirits of ammonia are often valuable. Severe cases should be under the care of a physician.

Palsy. See PARALYSIS; PARALYSIS AGITANS.

Paludamen'tum, a white cloak, which the commander of the Roman army put on in time of war. Sometimes, however, the color may have been crimson, and in the case of the emperor himself it was purple.

Paludan-Müller, päl'oo-dän-mül'lĕr, **Frederik,** Danish poet: b. Kjerteminde, on the island of Funen, 7 Feb. 1809; d. Copenhagen 29 Dec. 1876. In 1828 he entered the University of Copenhagen, and while a student there attracted attention by his poem 'Raab til Polen' (1831) and a drama 'Kjarlinghed ved Hoffet' (1832). His first poem of note was 'Dandserinden' (1833), followed in 1834 by the lyric drama 'Amor og Psyche' and by two volumes of 'Poesier' (1836–8). His later works include 'Venus' (1841, a dramatic poem); 'Dryadens Bryllup' (1844); 'Tithon' (1844); 'Tre Digte' (1854), among them the lyric drama 'Kalanus'; 'Nye Digte' (1861); and the two prose works, 'Ungdomskilden' (The Fountain of Youth) (1865); and 'Ivar Lykkes Historie' (1866–73), a novel. His chief work is 'Adam Homo,' a poem in *ottava rima*. An edition of his poems in eight volumes appeared in 1878–9.

Pal'udism (Lat. *palus, palud-*, a marsh), malarial poisoning; disease or disposition arising from malaria (q.v.).

Pam'ban-manche, or **Serpent Boat,** the native name for a long canoe used on the Malabar coast. They are from 30 to 60 feet in length, not more than three feet in beam, and are hollowed out of a single tree. The largest are rowed by about 20 men, double-banked, and can attain a speed of 12 miles an hour.

Pamela, pa-mē'la, or **Virtue Rewarded,** a novel by Samuel Richardson, published 1741–2. It was the first work of its author who began what is called the modern analytic novel. It won instant applause and a wide circle of readers, all classes of society following with close attention the shifting fortunes of Pamela Andrews, a serving-maid whom the son and heir of the family dishonorably pursues. Richardson created a new era in fiction when he chose a girl of the humble class for heroine, and made use of every-day contemporaneous persons, and scenes for the purposes of the novelist. Thus the story of incident and the analysis of character came into English fiction, and thus the modern novel traces its development from Richardson. It was satirized and parodied in 'Joseph Andrews' by Fielding.

Pamir (pā-mēr') **Plateau, The,** or **The Pamirs,** Central Asia, an elevated region described as a "huge boss or knot," north of the Hindu-Kush Mountains, connecting the Himalyan and Thian-Shan mountain systems. (See HIMALAYA.) The plateau is about 150 miles long by 150 miles broad, nine tenths of the area being mountainous and the rest pasture-land. The name applied to the valleys is derived from the Persian *pai* and *mir,* signifying "the foot of mountain peaks"; the region is called also by the Persians *Bām-i-dunyā* ("the roof of the world"). The territories belonging to Russia, China, Afghanistan, and Britain meet in the Pamir region, and until the completion of the Anglo-Russian surveys in 1895 demonstrated its strategic valuelessness, owing to climatic and physical conditions, it was a fertile source of political dispute. The plateau has a general elevation of more than 13,000 feet, dominated by still loftier ridges and summits attaining a maximum altitude of 25,800 feet in Mustagh-ata, in the Sarikol range, and covered with perpetual snow. On the plateau are several small lakes, and the sources of the Oxus. From November to April the Pamirs are snow-bound and prac-

tically inaccessible, while in the spring and summer the high winds make traveling very unpleasant. The great part of the surface is bare and barren; the native Kirghiz, however, find a certain amount of pasture for their cattle in summer, and in favored localities there is some cultivation. The "roof of the world" is celebrated throughout Central Asia, and notwithstanding its physical drawbacks, two recognized trade routes have traversed it east to west for ages.

Pamlico, păm-lē'kō, a river in North Carolina, really an estuary of Tar River, opening into Pamlico Sound. It is 40 miles long, from one to eight miles wide, and navigable for steamers which can enter the sound. Several small streams flow into the Pamlico River.

Pamlico, a sound or lagoon on the coast of North Carolina, the largest lagoon on the east coast of the United States. It is about 80 miles long and from 10 to 30 miles wide. It is separated from the Atlantic Ocean by long, narrow, sandy islands,— bars or beaches,— the point farthest out is called Cape Hatteras. Pamlico and Neuse rivers enter the sound, and the outlets on the east are Hatteras and Ocracoke inlets. The northern part is shallow, the southern part is about 20 feet deep. Fish and wild fowl are abundant. Several small islands skirt the shore. Roanoke, in the northern part of the sound, is the largest.

Pamlico Indians, a former American tribe living on the Pamlico River in Beaufort County, N. C. They were greatly reduced in number by the smallpox in 1697, and were practically exterminated by the Tuscarora war in 1711.

Pampa, păm'pä, or **Bamba,** a Quichua word meaning "plain," applied to various great plains in South America, and also occurring in proper names, for example, Riobamba, Moyobamba, Ayapampa ("Plain of Death"), and Cochabamba ("Lake Plain"). Rarely, as in Peru along the Ucayali River, forested plains are spoken of as pampas; the typical pampas are stretches of treeless plain, varied with rolling prairie, their vegetation being annual or perennial herbaceous plants, with a few shrubs. Water courses are absent, but there are many lakes or pools of rather brackish water. The predominance of grasses, especially varieties of the cereals, make the pampas in general an ideal feeding ground for steers, horses, and sheep. A marked botanical feature of the pampas is a huge thistle apparently indigenous to the Northern hemisphere.

In common usage Pampa or the Pampas is confined to a great plain in Argentina, the administrative district of Pampa Central, with General Acha (1,500 inhabitants) as capital, and a total population of 26,000. Here to a certain degree the original nature of the vegetation has been altered by tree planting, so that much of the plain, which 30 years ago was opened up for cattle grazing by Roca's successful expedition against the Indians of this region, now no longer grows the pasto amargo, but only grasses better suited for sheep. These are tended by Gauchos, Spanish and Indian half-breeds. A few years ago it was estimated that 5,300,000 sheep, 520,000 beef cattle, and 221,000 horses, mules, etc., grazed in this great plain. The Pampas have been scientifically studied by d'Orbigny, Darwin, and Roth. Beneath a layer of thin vegetable mold, there is 40 or 50 yards of reddish clay, with an admixture of fine sand of chalky infiltrations, apparently proving repeated inundations in geological time. There is a rich prehistoric fauna, notably remains of machærodus, hippidimus, mylodon, megatherium, and mastodons; in the whitish lacustrine deposits near the surface fragments of terra-cotta and primitive tools, as well as bones (some of prehistoric animals), engraved and polished by man. Consult Ameghino, 'La antiguedad del hombre en la Plata' (1880).

Pampa Aullagas, owl-yä'gäs, or **Poopo.** See AULLAGAS.

Pampanga, päm-pän'gä, Philippines, a province of the island of Luzon, situated in the southwestern part of the island, bounded on the north by Tárlac, on the east by Bulacán, on the south by the Bay of Manila, and on the west by Zambales; length 37½ miles from north to south; greatest width 34 miles; area 2,209 square miles. The province is high in the north and mountainous in the northwest and west, but low and marshy in the south; along the shore of Manila Bay and for several miles inland the country is covered by canals and the estuaries of the Grande de la Pampanga River. The principal products are rice (raised in the lowlands of the south), sugar, sweet potatoes, gabe, tobacco, and cotton. Agriculture is the chief occupation of the inhabitants, but mechanical industries are also quite extensively developed; the most important are weaving and the manufacture of sugar, the fisheries of Pampanga are increasing in importance, and there is a large local trade in nipa, sugar, honey, sacks, etc. There are roads connecting all the towns, and connecting the province with Manila, Cavité, Tárlac, and Nueva Ecija; the Manila & Dagupan Railroad crosses the province from southeast to northwest, passing through the larger towns, and has been an important factor in the industrial development of the province. The great majority of the people are Pampangos (q.v.). Civil government was established in the province in February 1901. Pop. 224,000.

Pampanga, Rio Grande de la, rē'ō grän'dā dā lä päm-pän'gä, one of the four great rivers of Luzon, Philippines, is formed in the northern part of Nueva Ecija by the junction of a number of streams that drain the western slopes of the Caraballos Sur, flows southwest and south through the provinces of Nueva Ecija and Pampanga, and empties into Manila Bay through a delta of eight mouths. It drains a large territory, and has numerous tributaries, chief among them the Rio Chico de la Pampanga; in the rainy season it overflows its banks in the lower part of its course, and these inundations make fertile soil for the cultivation of rice. It is about 100 miles long, and the means of a large local trade.

Pampangos, a group of tribes of the Philippine Islands inhabiting the province of Pampanga, Luzon, and single localities in Nueva Ecija, Bataán and Zambales. They are of the Malay race, and at the time of the Spanish conquest of the islands had a civilization and writing of their own. In Pampanga they use their own language, which is spoken exclusively in that province.

Pampas, păm'pạz (Sp. păm'pās). See PAMPA.

Pampas Cat. See GRASS-CAT.

Pampas Deer, a small deer (*Cervus campestris*) of the plains of southern South America, having antlers of three points each.

Pampas Grass, the most beautiful and the most important commercial ornamental grass (*Gynerium* or *Cortaderia argenteum*). It is a native not of the pampas of South America, but of the well-watered higher lands of Brazil and the Argentine Republic. It grows in large clumps, has leaves often more than six feet long, and flowering stems frequently exceeding 10 feet in height, surmounted by great graceful plumes (panicles) of silvery-white flowers which may occupy even more than two feet of the stem. This beautiful plant is grown in large quantities in California and sold for use in decoration, the plumes often being dyed with aniline in various tints. Outside of California, which is the only country where this grass is grown for market, the plants are cultivated for ornament in parks and gardens, but in the north they need protection with leaves or litter during the winter. They will grow in any good garden soil with no special attention. There are several horticultural varieties whose flowers are pink, carmine, purple, and intermediate tints. Two related species are of some importance: uva grass (*G. saccharoides*), a native of Brazil, furnishes considerable sugar, and *G. jubata,* a plant even more graceful than the pampas grass. Neither is grown in the United States, the former being very tender and the latter little known.

Pampas del Sacramento, păm'pās dĕl săkrä-mĕn'tō, Peru, great plain in the northeastern part of the republic, between the Ucuyali and Aullaga (or Huallaga) rivers. It is crossed by excellent waterways, has a rich vegetation, and was settled in the 18th century by Jesuit missionaries, but is now almost deserted.

Pampeluna, păm-pā-loo'nä, or **Pampelune,** păṅp-lün, variant spellings of Pamplona (q.v.).

Pamphilus, păm'fĭ-lŭs, Greek painter: b. between 390 and 350 B.C. He and Eupompus were the founders of the Sicyonian school of painting. He was the teacher of Apelles and Melanthus and was famous for scientific accuracy in drawing and perspective. He made his pupils pay him a talent (about $2,000) for a course in painting. Among his works famous in antiquity were 'The Battle of Phlius'; 'The Voyage of Ulysses'; and 'Family Group.'

Pamphilus, Saint, a priest of Cæsarea, by birth a Phœnician, who for refusing to sacrifice to idols was cast into prison. He was a theological teacher at the famous catechetical school at Alexandria and collaborated with Eusebius in writing 'The Apology for Origen.' Persisting in adherence to the Christian faith he was condemned to death (309) and suffered martyrdom by decapitation 16 February, the day on which his festival is celebrated.

Pamphlet, a name applied to an ephemeral publication, occasional and not periodical, commonly discussing some question of public or special interest at the time. There are thus two distinct classes of pamphlets, the one addressed to the general public, and discussing some question of immediate though probably of temporary interest. Political pamphlets form the type of this class. The other is addressed to a special class of readers, and discusses something connected with their particular interests or pursuits. Pamphlets of both classes are now to a great extent superseded by the opportunities of discussion afforded by regular periodical literature. They still, however, serve many important uses. Pamphlets have at various times since the introduction of printing exercised a very important influence, especially in this country, and in general in all times of political and religious excitement pamphleteers have been both numerous and vehement. They have comprised all sorts of men, from scholars and men of genius to the most vulgar and venal of partisans. Consult Waugh, 'The Pamphlet Library' (1898).

Pamphylia, păm-fĭl'ĭ-ạ, ancient division of Asia Minor, bounded on the north by Pisidia, on the east by Cilicia, on the south by the Mediterranean (Gulf of Adalia), and on the west by Lycia. Its coast line measured 75 miles, and its extent north and south was about 30 miles. The geological formation is peculiar, the entire surface of the country having been greatly changed since classical times by continuous fluviatile deposits of carbonate of lime. The region was never an independent kingdom, so far as we know, but was successively subject to Lydia, Persia, Macedonia, Pergamum, and Rome. The population in early times seems to have consisted of an admixture of Semitic and Indo-Germanic elements. There were Greek settlements at Perge, Aspendus, Side, Cibyra, and Attalia, and remains of Pamphylian inscriptions show that the dialect of Greek used there resembled both Cyprian and Arcadian and hence was a very early form. Consult: Ramsay, 'Historical Geography of Asia Minor' (1890); Radet, 'Les Villes de la Pamphylie' (1890, in 'Revue Archéologique'); and Lanckoronski, 'Städte Pamphyliens und Pisidiens' (1890).

Pamplona, păm-plō'nä, **Pampeluna,** or **Pampelune,** Spain, capital city of the province of Navarre, situated near the French border, 200 miles northeast of Madrid, in a plateau 1,400 feet above sea-level, on the right bank of the Arga River and on the railway from San Sebastian to Saragossa. There is an old and a new quarter. The former with its narrow streets has changed little since the city was the capital of the French kingdom of Navarre; but the new part is regularly laid out. The main objects of interest are a cathedral, begun by Charles III. in 1397, the historic hall where the Cortes of Navarre used to meet, the churches of San Nicolas and San Saturnino, and several fine promenades and boulevards, La Taconera being the best; nearby are the gorges of Mayo and Roncevalles. A citadel built by Philip II. has been reinforced by more modern fortifications; the city is an important point strategically. The main industries are the manufacture of leather, linens, paper, flour, soap, strings for musical instruments, and wines. There is a great market at Pamplona from 29 June to 18 July. The city may have been a Roman colony Pompeiopolis; but the derivation is not certain. It was taken from the Arabs by Charlemagne in 778, passed to Ferdinand of Aragon in 1512, was held by the

French during the Peninsular war, and figured in the Carlist insurrections. Pop. (1900) 30,609.

Pamunkey, pa-mŭnk'ĭ, a river in Virginia, formed by the junction of the North and South Anna. It joins the Mattapony at West Point and forms the York River. From the source of the South Anna to the York is 100 miles. The Pamunkey Indians have a reservation on the Pamunkey River.

Pamunkey, pa-mŭnk'ĭ, and **Totopotomoy,** two streams in Virginia, the banks of which were the scenes of military operations during the Civil War. When Gen. Grant withdrew from the North Anna (q.v.) on the night of 26 May 1864, he moved rapidly by the left to cross the Pamunkey, about 33 miles east. Gen. Sheridan, with Torbert's and Gregg's cavalry divisions, preceded the infantry in the afternoon, and at 9 o'clock next morning had crossed the Pamunkey and occupied Hanover Town, near which place, on the Hanover Court House road, one of Gen. W. H. F. Lee's cavalry brigades was met and forced back toward Hanover Court House. On the morning of the 28th Gregg's cavalry division, advancing on the Mechanicsville road, had a severe engagement with the Confederate cavalry near Hawes' Shop (q.v.) and, aided by Custer's brigade, drove it back upon the infantry at the Totopotomoy. Gen. Lee had early information of Grant's movements, and on the 27th put his army in motion to interpose between him and Richmond. Early's corps crossed the South Anna, and by midday of the 28th was in position with its right near Beaver Dam Creek, its left on the Totopotomoy, near Pole Green Church, four miles from Hawes' Shop. Anderson's corps formed on Early's right, and covered the road from White House, on the Pamunkey, by Old Church, Bethesda Church, and Mechanicsville, to Richmond. Hill's corps and Breckinridge's command extended on Early's left to near Atlee's Station, crossing the Virginia Central Railroad a mile north. On the afternoon of the 28th the Sixth and Second Union corps crossed the Pamunkey at Huntley's, four miles above Hanover Town, and took position across the Hanover Court House road at Crump's Creek, and the Fifth corps crossed at Hanover Town, the left near the Totopotomoy, an affluent of the Pamunkey, which it entered two miles below Hanover Town. The Ninth corps crossed at midnight. The Second, Fifth and Sixth corps formed a line in front of Hanover Town, 17 miles from Richmond, the Sixth on the right, the Second in the centre, and Fifth on the left. At noon of the 29th Barlow's division of the Second corps advanced on the road from Hawes' Shop to Atlee's Station, small bodies of Confederate cavalry falling back before it to the other side of the Totopotomoy, where the infantry was found strongly intrenched. Warren's Fifth corps took position on the Shady Grove Church road, skirmishing with the enemy. Wright's Sixth corps moved on the right of the Second, occupying for a time Hanover Court House, and then closing in to the left, and the Ninth corps moved between the Second and Fifth, pushing out on the road to Pole Green Church. There was incessant skirmishing during the 30th in an effort to develop the Confederate position, and late in the day Early's corps attacked Warren's Fifth corps near Bethesda Church and attempted to turn its left, but was repulsed. To relieve the pressure on Warren, Hancock at 7 P.M. was ordered to attack, and Brooke's brigade carried the first line of rifle-pits occupied by the Confederates. On the 31st Birney's division crossed the Totopotomoy and carried the enemy's advanced line on the right of the Richmond road. Gen. Wilson's cavalry division moved to Hanover Junction and destroyed the railroad bridge over the North Anna, at the same time defeating the Confederate cavalry and driving it from Mechump's Creek; and Sheridan, with two divisions of cavalry, was sent to occupy Cold Harbor, driving the enemy out, and was directed to maintain his position at all hazards. On 1 June Warren moved out to develop the Confederate position, and found it intrenched strongly in his front, beyond clear ground, swept by artillery fire. He lost 200 killed and wounded, extended his line some distance to the left, and was attacked in several places during the day, and quite severely on the right just before dark. Everywhere Gen. Grant had found Gen. Lee confronting him in strong works, and determined again to retire from his direct advance toward Richmond and to throw his troops rapidly to the left to Cold Harbor (q.v.). This movement began on the night of 31 May, the corps moving successively from the right. Consult: 'Official Records,' Vol. XXXVI.; Humphrey, 'The Virginia Campaign of 1864–5'; Wather, 'History of the Second Army Corps'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV. E. A. CARMAN.

Pan, in Greek mythology, a rural divinity. Comparative philology, showing that the name is related to *pastor* (Latin, "shepherd"), agrees with the results of modern mythological study which traces his various attributes back to an original god of the flocks, so that we can credit neither the decadent explanation of his name, from the Greek word meaning "all," by his being the son of Penelope and *all* the suitors, nor agree with the Stoics who made of him a god of the universe, the ever-present spirit of nature in *all* things. It seems evident that Pan was originally a shepherd god of Arcady; indeed the figure that Arcady cuts in modern pastoral poetry seems to be due entirely to its mention in classic authors in connection with the pastoral god. Considered as a typical shepherd Pan naturally develops into hunter, fisherman, and, in time, warrior; and "Panic fear" or "panic" is explicable as an extension of the unreasoning terror that seizes a flock of sheep. Another school of mythologists stress the fact that Pan was an Arcadian god, make his various rural activities merely those of the normal Arcadian, and explain his warlike functions by noting that the Arcadians were often mercenaries; but this scheme fails to explain the myth of Pan's love of Selene, the moon-goddess, which is perfectly explicable if we reckon the god a shepherd who must "watch by night." The Arcadian myths of Pan's birth are many, the commonest make him son of Zeus and Callisto, or of Hermes and a daughter of Dryops, and associate him closely with Dionysus. The myth and the cultus of Pan spread slowly through Greece. He was not worshipped at Athens until after the battle of Marathon, where the panic of the Persian army

was accredited to him; compare Browning's poem 'Pheidippides.' In Rome Pan was identified with Faunus or Inuus and later confused with the Satyrs, so that *Panes* and *Panisci* were spoken of; moreover his nature was sensualized somewhat, so that in early Christian times he became par excellence the god of Greek heathenism. Hence the myth of the death of Pan at Christ's birth; and hence, too, because of the representation in art of Pan as a horned being half-man, half-goat, the popular picture of the devil. Earlier Greek art, it must be remembered, made of him merely a beautiful young shepherd, only occasionally giving him horns, such as were worn by other divinities of nature, notably the river-gods. Consult: Wieseler, 'De Pane' (1875); Roscher, 'Ueber Selene und Verwandtes' (1890).

Pan-American Conference, in American history, a convention held in Washington, D. C., in 1889–90 at the instance of James G. Blaine, then secretary of State, at which delegates were present from all the governments of South and Central America. A second conference was held in the City of Mexico 22 Oct. 1901, delegates being present from 19 states. These conferences had for an object the furtherance of international comity and commerce among the races of the American continent. The meetings of the first conference were protracted for nearly six months, the delegates meantime visiting every city of importance in the United States. The conference possessed no legislative or executive functions, its duties being purely advisory. The definite recommendations made by the conference included a coinage of uniform weight and fineness, a common method of legalization of documents, the metrical decimal system, and a uniform system of weights and measures, regulation of the fees of consular agents, and certain conveniences of method in customs administration. These were only suggestions to the countries represented, and they could be made effective only by treaties. Other important propositions were unanimously adopted, such as a great trunk railway; government subsidies for steamship lines connecting the American countries represented; uniform protection for literary and art property, trade-marks, and patents; uniform quarantine regulations; a uniform extradition treaty, and a great international bank.

Pan-American Exposition, a great fair held in Buffalo, N. Y., from 1 May to 1 November 1901. It was so called from the large number of exhibits brought from Central and South America. The numerous buildings were made of staff, as were those of the Columbian Exposition, but were tinted a soft greenish-blue, thus avoiding the glare of the pure white. Power for the electrical exhibit was derived from Niagara Falls. Over 5,000 horse-power and 200,000 incandescent lamps were used. The electrical tower alone had 44,000 electric lights on its sides. The "Midway," a section of the grounds devoted to various kinds of shows and entertainments, was very popular. It included a Japanese village, an Indian Congress, panoramas, etc. Financially the exposition was a failure, due largely to President McKinley's assassination, which caused a temporary closing. The total cost of the exposition was $8,860,757.20; the total receipts $5,478,589.37. See EXHIBITION.

Pan-Presbyterian Council. See PRESBYTERIAN SYSTEM, ALLIANCE OF THE REFORMED CHURCHES THROUGHOUT THE WORLD HOLDING.

Pana, pā'na, Ill., city in Christian County; on the Baltimore & O. S. W., the Cleveland, C., C. & St. L., and the Illinois Central R.R.'s; about 40 miles southeast of Springfield. It was settled about 1845, and in 1867 was incorporated. It is in an agricultural region in which hay and corn are important products. In the vicinity are coal deposits. About 1,000 employees work in the coal mines; the hay compress companies have about 40 employees, and other industrial works employ about 50 more. There are seven churches, public and parish schools, and a free public library. The two banks have a combined capital of $250,000. The general law of 1870, for the government of cities, is in force in Pana. The waterworks are owned and operated by the city. Pop. (1890) 5,077; (1900) 5,530.

Panætius Rhodius, Stoic philosopher: b. Rhodes about 180 B.C.; d. Rome about 110 B.C. He spent most of his life in Rome disseminating the tenets of Greek and more especially of Stoic philosophy. Here he enjoyed the friendship of Lælius and the younger Scipio. He subsequently traveled extensively in the East and visited Egypt and on his return opened a Stoic school at Athens. He really belonged to the middle Stoic or Eclectic school and borrowed from Plato and Aristotle. Only fragments of his writings are extant to-day. His chief treatise was one on 'Duty' from which Cicero in his 'De Officiis' has drawn much material. Consult: Van Lynden, 'De Panætio' (1802); Schmekel, 'Die Philosophie der mittlern Stoa' (1892).

Panama, pā-nā-mā', republic of Central America, bounded on the north by the Caribbean Sea, on the east by the Gulf of Darien and the Atrato River, which separate it from Colombia, on the south by the Pacific Ocean, notably on the southwest by the indenting Gulf of Mexico, and on the west by Costa Rica, the boundary being unsettled and long in dispute. The interior in general, and especially in the northwest along Mosquito Bay and in the southeast along the Atrato River is marked "unexplored" on the most recent and complete maps of the country. The interior is thick with hills and mountains, a few being extinct volcanoes. These have no connection either with the North American Cordilleras or with the Andes. The only systematic ranges are a bit of the Costa Rica central divide, which runs over into western Panama, and on the Atlantic coast further east the Cordillera de San Blas. The detached and irregular hills are often separated by streams greatly subdivided. The banks of these streams, and, indeed, the greater part of the country is covered with dense tropical vegetation. The exceptions to this rule are a few treeless uplands along the Pacific side between the Costa Rica border and the Gulf of Panama. The streams are unimportant with the exception of the ill-named Rio Grande, emptying into the Pacific near the city of Panama, and the Rio Chagres which flows into Limon Bay near Colon. The importance of these two rivers lies largely in their proximity to the projected canal. This lack of interior waterways and the general impassability of the country make the only outlet for most towns the sea and make other

means of communication (save between Colon and the city of Panama by rail), as well as other location than near the sea, practically impossible. The altitude of the country varies between 200 and 1,500 metres. The climate is warm and damp, and extremely unhealthy. The terrible mortality consequent upon the canal excavations made by the French are so commonly taken to prove that the earth if merely upturned breeds a deathly miasma, the "creeping Johnny," that the natives neither hoe nor plow in their small agriculture. But the high death rate is quite as probably explicable by the lack of sanitation and by the unrestrained use of mountain streams for laundries, drains, cesspools, and drinking water reservoirs.

History.— Columbus landed on the isthmus in 1502. Then came further exploration, notably by Balboa, and in train of that colonization, still in the first quarter of the 16th century. In the more flourishing days of Spanish rule in that century and the next the country in general and the city of Panama (q.v.) in particular enjoyed the advantages coming from the shipment of South American silver and gold. But this prosperity had so drooped at the close of the 18th century that Panama was largely isolated from Colombia and took comparatively little part in the various revolts that culminated in Colombian independence in 1819. Two years after that date, however, the people of Panama proclaimed their independence and became part of the republic of Colombia. This was a strongly centralized government held together by little but Bolivar's personal influence and power. It was shattered in 1831, the year after his death, and three new republics were formed, namely, Venezuela, Ecuador, and New Granada. The last named included the Isthmus. Strangely enough the form of government of the new republic was practically identical with that which had brought it to revolt against Colombia; and in the new republic of New Granada the centralized government was equally ill-adapted to its heterogeneous elements. Moreover there was no simple and speedy means of intercommunication such as might have welded the country into some national unity. In the existence of this type of government is the philosophic key to the history of both the old republic of Colombia down to 1831, and after that date of New Granada and the New United States of Colombia. It was in the very nature of things that as New Granada had broken from Colombia, so Panama, New Granada's remotest part, must break, or attempt to break from New Granada. A state's rights or Federalist party did rapidly rise throughout New Granada. In 1840 revolutions broke out in most of the provinces. An independent "State of the Isthmus," containing the provinces of Panama and Veragua, was proclaimed in 1841, but the Centralists were successful, the revolution was suppressed, and the old régime was restored. The sentiment against this method of government steadily increased until in 1855 by an act of the Congress of New Granada at Bogota the autonomous state of Panama was erected out of the Isthmian provinces. But the sincerity of this act may well be questioned and its aim was probably political and the purpose to crush the Federalist party for good and all. But the attempt of the national government to revoke its act, and, it seems, to provoke a revolution, and then in crushing that revolution to put a stop to all Federal agitation, overreached itself. The revolution in behalf of the new constitution was completely successful. For a score of years and more Panama, like the other states in the Colombian Union, enjoyed (more or less interruptedly) its individual rights. A Centralist uprising in 1885, however, effected a return to old conditions. The former state of Panama was again ruled from Bogota, and became a department called Panama. This department was divided into four provinces, Chiriqui, Veraguas, Azuero, and Panama; the last named province occupied the eastern half, approximately of the department of the same name, with which it is very easily confused.

It is worth noticing in passing that during this revolution in 1885 the United States of North America landed marines to protect the transit of the Isthmus between the cities of Colon and Panama, a circumstance of material assistance to the Centralist insurgents, but an act undertaken simply for the sake of interoceanic and trans-Isthmian commerce. That it could have been for any reason other than this is impossible, since the right and duty of the United States to preserve neutrality in the Isthmian strip was due to a treaty made in 1846 with the government of New Granada, a government not in existence in 1885. In short the obligation was one to a territory and not to any power; and if to any power simply to that in control of the Isthmus, no matter what its relation to the original treaty-making power.

Since 1885 the relations of Panama with Colombia have been no closer nor more familiar than before. Several revolts have taken place, and in July 1900 under the lead of Porras, later a leading candidate for the vice-presidency of the republic, a desperate but unsuccessful attempt was made by a Liberal army to get control of the city of Panama. In 1903 a more successful plot was planned, growing out of the discontent of the people of Panama with the attitude of Colombia toward the Panama Canal Treaty with the United States. Whether through fear that the United States would in time gain sovereignty over the canal — there was an old saying that the canal when built would become the southern boundary of the United States — or a hope that the bid for the canal might be largely increased, the Colombian Congress refused to ratify this treaty and adjourned 31 Oct. 1903. By the terms of the Spooner Bill this made the Panama Canal apparently an impossibility and the Nicaragua Canal a certainty, for the President had been bidden to treat for the Panama Canal, and if such negotiations failed to carry through the project of the Nicaragua Canal. In short, the people of Panama would have been deprived of the fulfilment of their hopes of renewed commercial importance by this inexplicable action of the Colombian Congress, had not the revolution planned as early as the summer of 1903 offered a solution. How the desire for autonomy, the desire for a canal, and the desire for the money to be paid for the canal, respectively, bulked in the minds of the revolutionary plotters it is impossible to say. The foregoing sketch of Panama's political history would show at least that a revolution for purely political reasons was a possibility. The mixture of motives amounts to little more than a coincidence of several impulses, each of which alone would

have been sufficient. On 3 Nov. 1903 — that is three days after the adjournment of the Colombian Congress — the municipal council of the city of Panama proclaimed the independent republic of Panama. There was no bloodshed. An army of 400 Colombians (mostly boys between 12 and 14) arrived 4 November in Colon, whence its general with his staff went to Panama, was dined there, and upon his refusal to acknowledge the new republic, of which he knew nothing until the evening of the 4th, was imprisoned for a few days, but on the 7th with his army was shipped back to Cartagena from Colon. In the meantime upon the 6th of November the United States government recognized the new republic, being satisfied that there was not the slightest internal opposition to its establishment. France's recognition followed 10 November, and soon afterward like action was taken by Germany, England, and Russia. The remarkable haste with which the provisional government was recognized by our own is not without precedent; in a Senate debate 5 Jan. 1904, Senator Lodge pointed out that in 1848 the French republic was recognized after three days and that the Republic of Brazil had received formal recognition within two days after its formation. It is to be noticed also that Panama's government may perfectly justly be reckoned a "resumption" of previous independence. As to the action of our government in landing marines to protect the trans-isthmian railroad, its defense lies in an appeal to the Treaty of 1846, to the precedent of 1885, when the Centralist cause was as much (and as unintentionally) aided as it was checked in 1903, and to the principle that it is the Isthmian commerce that we aim to protect by keeping the strip neutral rather than any government, and hence that an appeal from any established power in the Isthmus for protection of the railroad must be met by speedy and unhesitating action. The objections to this view of the case and the disagreement with the actions of the present administration come from various sources; first, as in the case of the New Haven petition sent to the Senate 11 Jan. 1904, from unpartisan constitutional experts; and second from the opposition in Congress and the supporters of the Nicaragua route, who see their last chance to win. The New Haven petitioners simply beg the Senate to make a careful and deliberate investigation. The opposition in Congress (and in the press) urges that the revolution in Panama was fostered if not actually started by the Republican administration and the landing of troops was for the purpose of preventing Colombia from subjugating the rebellious department; in fine, that both revolution and recognition grew out of pure self-interest in the proposed canal. Whatever the merits of these arguments, the inability of the Democratic caucus to bind its members to oppose the Canal Treaty, the instructions from the Mississippi Legislature to the Senators from that State, and 11 Jan. 1904 the practical confirmation of the nomination of W. I. Buchanan to be minister to Panama by the tabling Senator Morgan's motion to reconsider, — all these things seem to show that the actual opposition to the course of the administration is likely to come to a speedy end.

The provisional government founded 3 November was in the hands of a junta consisting of J. A. Arango, Tomas Arias, and Federico Boyd. The last-named member of the junta arrived in the United States on 18 December and late the same day a Canal Treaty was signed by Secretary of State John Hay and the minister from Panama to the United States, Philippe Bunau-Varilla (see VARILLA, PHILIPPE BUNAU), who had been formally received at Washington eight days before. This treaty is practically the same as the convention made with the Colombia; the compensation is the same; but the canal strip is made wider and the powers granted to the United States are larger. The junta named above took control of the government, being assisted by the following provisional cabinet: Minister of Government, Eusebio Morales; Minister of Finance, Dr. Manuel Amador (the successful candidate for the presidency); Minister of Foreign Relations, F. V. de la Esprilla; Minister of Justice, Carlos Mendoza; Minister of Public Instruction, N. Victoria; and Minister of War and Marine, M. de Obarrio, Jr. On 27 December a general election of delegates to a national convention took place. In most instances municipal authorities acted as electors; the scheme of manhood suffrage originally promulgated having proved impracticable. Four delegates were chosen from each province except Panama, which elected eight, making a total of 32. These delegates, meeting 15 Jan. 1904, are called to frame a constitution and to elect a president. The provisional government ratified the Canal Treaty 2 Dec. 1903, and five days afterward the treaty was submitted to the United States Senate, where the question of its ratification furnished an opportunity to criticise the stand of the administration throughout in its relations to Panama, as has been outlined above. On 16 Feb. 1904. Amador was elected president, with Arasemena, Obaldia, and Mendoza as *designados*, or vice-presidents.

Statistics.— With an area of 31,500 square miles and an extent east and west of 460 miles the republic of Panama has a population of scarcely 300,000 of the most heterogeneous sort. There are a few natives of Europe and of the United States, mostly engaged in the operation of the railway; many people of Spanish and Indian descent; and especially on the Atlantic coast, a number of English-speaking negroes and mulattoes. The chief commercial cities are Colon (or Aspinwall), with a population of 3,000, and Panama (q.v.), the termini of the present railroad and of the proposed canal. The commerce of the country is mainly with the United States. Complete figures are lacking, but a total of those given for Panama and Colon would not fall far short of being complete. For the commerce of the City of Panama see that title. The imports at Colon in 1903 were valued at $952,684, distributed as follows: United States, $614,179; France, $119,086; England, $118,322; Germany, $76,386. The principal imports from the United States were: Dry goods, $200,744; provisions, $189,333; coal, $59,890; lumber, $38,642; kerosene, $32,900; hardware, $31,940: liquors, $30,400. The exports from Colon to the United States for the fiscal year ending 1 June 1903 amounted to $173,370, and included: bananas, $75,432; cocoanuts, $54,060; turtleshells, $12,742; ivorynuts, $9,400; hides, $6,460; coffee, $5,424.

Panama, city of Central America, capital of the republic of Panama, situated on a coral

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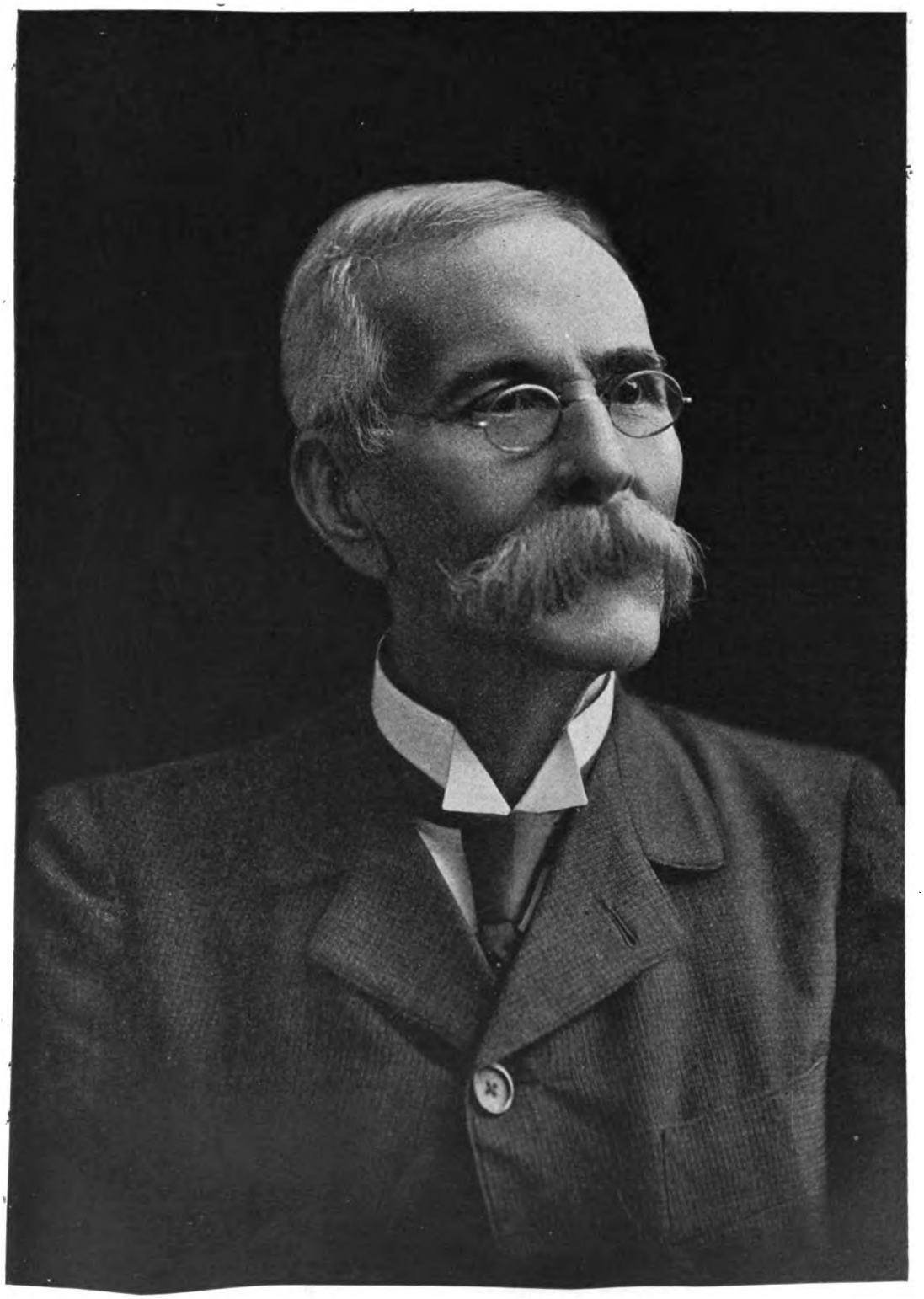


DR. MANUEL AMADOR,

FIRST PRESIDENT OF THE REPUBLIC OF PANAMA.

Mau

peninsula running into the Gulf of Panama. It has no actual port, but vessels anchor safely between the mainland and a chain of islands. Founded near the Pacific coast in 1518 by Pedro Arias Davila, Panama became wealthy in the days of the Peruvian mines, and was the oldest and richest colony in America in 1671 when it was taken, looted, and burned by the buccaneer, Sir Henry Morgan (q.v.). The present city, six miles from the site of the old, was built two years after, and with its granite fortifications, now in ruins, was long the strongest Spanish fortress on the Pacific. The rush of gold-hunters to California in 1849 renewed its prosperity somewhat and in 1855 procured for it railroad connections with Colon, a new port on the Atlantic; nearly 100,000 passengers and 1,000,000 tons of freight landed by about 1,000 steamships are annually carried by this road. Besides this mere reshipping business it has the large part of the export trade of what is now the republic (and was the department) of Panama. In 1903 the city shipped to the United States india rubber valued at $49,974, hides at $56,767, cocobolo nuts at $27,805, ivory nuts, $16,598; deerskins, $13,372, and coffee, $6,908, a total of $193,402. The city is the seat of a bishop and of several consulates, and has a cathedral, ruined convents, a Jesuit college and a university founded in 1751. Panama is the centre of the country; in it the revolution against Colombia was carried out 3 Nov. 1903. Pop. about 30,000.

Panama, Isthmus of, the tongue of land connecting the northern and southern American continents and varying in width from 30 to 70 miles. The isthmus runs east and west with a double curve in either coast line, so that the western hollow made by Mosquito Bay on the north side and the eastern indentation of the Gulf of Panama on the south side, each with a corresponding bulge opposite, give the entire isthmus the shape of a recumbent S or of the sign of variation. In this more extended use of the term the words Isthmus of Panama are applied to the entire republic of Panama (q.v.), that is, what was formerly the department of Panama. The term is also used of the eastern and narrower part, corresponding roughly with the former province of Panama; to this part the name of Darien was originally applied. The isthmus was reached by Columbus in 1502, and was an immediate field for Spanish civilization. It was crossed in 1513 by Balboa, who "from a peak in Darien" discovered the Pacific. The cities of Panama and Nata were colonized before 1520. The isthmus was also the scene of the Darien scheme of colonization fathered by William Paterson (q.v.). In spite of its having been known so long to European explorers, large parts of the Isthmus to the west of Colon are unexplored. The contour of the isthmus is broken by irregular hills much worn by erosion.

Panama Canal, an all-water route between the Atlantic and Pacific to run from Colon to the city of Panama. Balboa's explorations of the Isthmus were made with the particular purpose of discovering a strait which would make possible the longed-for western passage. In 1550 a Portuguese navigator, Antonio Galvão, brought to the attention of the King of Spain a plan to cut a canal through the isthmus, but for political reasons the project was suppressed, and the death penalty was attached to any attempt to reopen the matter. A canal at Nicaragua was suggested by Nelson in 1780, and in 1804 Humboldt mapped five routes, one of them between Chagres (near Colon) and Panama. Spain had determined to begin work when the country was snatched from her control in 1821 by the independence of New Granada. Guatemala, San Salvador, and Honduras tried to interest Louis Philippe in a canal in 1844, but were unsuccessful. The discovery of gold in California in 1849 renewed interest in trans-Isthmian commerce and six years later the railway between Chagres and Panama, practically the route of the canal now planned, was built. An American commission between 1870 and 1875 examined the routes proposed and declared in favor of a canal through Nicaragua. The investigation was renewed with greater care upon the suggestion of the International Congress of Geographical Sciences which met in Paris in 1875. From the end of 1876 to the spring of 1879 a French commission, led by Bonaparte Wyse, made careful surveys in the Isthmus. Acting upon these in 1879 an International Congress, meeting in Paris and convened by Ferdinand de Lesseps, decided that the best route for a canal was from the Bay of Limon to the Gulf of Panama and that the canal should be a tide-water canal. Almost a year before the meeting of this Congress Wyse had received from Colombia permission to build the canal. This concession he had immediately transferred to de Lesseps, who at the second attempt managed to float the first Panama Company. The expense was tremendous, and it was necessary to issue loan after loan until in 1888 the French public refused to buy anywhere near the total amount of stock offered. On 4 Feb. 1889 the Company was declared insolvent and a receiver was appointed. A commission sent to the Isthmus in 1890 reported that a canal with locks could be finished in eight years at an expense of 900 million francs ($180,000,000). There had been rumors of mismanagement even before the dissolution of the Company in March 1889, and 11 June 1891 an investigation into the affairs of the Company was ordered. It lasted 17 months, and was followed by another from November 1892 to June 1893 and a third from June 1897 to July 1898. Bribery, corruption and maladministration were brought to light. But the case (like the Dreyfus affair) was so enmeshed in politics and involved so many in high position that justice was never done; apparently great injustice was done to de Lesseps and his son, who were convicted in 1893 of misappropriation of funds, sentenced to fine and imprisonment, and never punished. Though occasional spasmodic attempts were made to carry on the work, for the most part to come up to the requirements of repeated renewals and extensions of time from the Colombian government, this was the end of French activity in Panama save on a small scale. American interest in an interoceanic waterway was sharply aroused by the exigencies of the war with Spain. Going on the results of the Commission which had reported in 1876 every one turned to the Nicaragua project; the Panama Canal seemed out of the question. And

a new commission appointed by President McKinley in 1899 also reported in favor of the Nicaragua route, being influenced to do so by the prohibitive price first set by the French company on its franchise and property in Panama. But a supplementary report in favor of the Panama Canal followed the offer of the French company to sell for $40,000,000, the valuation set by the American Commissioners. Both houses of Congress had previously shown their readiness to vote for the Nicaragua scheme; and in the Senate particularly its adherents under the leadership of Senator Morgan of Alabama, chairman of the Senate's Committee on Canals, seemed pledged to that route. The Senate, however, was quickly won over by the efforts of Senator Hanna, who had become interested in the Panama scheme, it is said, by the efforts of Philippe Bunau Varilla (q.v.), one of de Lesseps' engineers, and now minister of the republic of Panama to the United States. The House of Representatives was brought over by the compromise measure called the Spooner act, which was passed in January 1903. It authorized the President to carry through such negotiations with Colombia as would assure the digging of the Panama Canal, and, if this proved impossible, to treat with Nicaragua and build the canal along the route originally recommended by the Walker Commission. The title of the French company was first investigated and 16 Feb. 1903 the United States accepted the offer of the Panama company to sell out for $40,000,000, on the condition that terms could be made with Colombia. The Hay-Herran treaty was signed by representatives of the two governments after long delay; was sent to the Senate for ratification in January 1903; was successfully opposed by Senator Morgan and his few followers through the session of the 57th Congress; and was passed upon favorably 18 March in special session after a debate of almost exactly a fortnight. This treaty arranged for the payment of $10,000,000 for the concessions, a payment of $250,000 per annum beginning in the tenth year after the ratification of the treaty, and in return a lease of the canal for 100 years, with the privilege of continued renewals at the pleasure of the United States. The Clayton-Bulwer Treaty had previously been revoked and superseded by the Hay-Pauncefote treaty of 1901, so that Great Britain allowed the right of the United States to build and police the canal alone. But all obstacles were not removed even yet, for the Colombian Congress now refused to ratify the treaty which had been signed by its representative in Washington. This obstacle was removed 3 Nov. 1903 by the declaration of the independence of the Republic of Panama (q.v.), which immediately sent one member of its provisional junta to Washington, where 18 November the Hay-Varilla treaty was signed. (For a summing up of its details see PANAMA, REPUBLIC OF.) This treaty was ratified in Panama 2 Dec. 1903, and 7 December was submitted to the U. S. Senate for ratification.

For a technical description of the Panama Canal, and for a comparison between it and the Nicaragua Canal, see the article ISTHMIAN CANAL.

Panama Congress, a congress of representatives of various American nations held at Panama June 1826, for the discussion of matters of interest to the American peoples. The meeting was originally intended only for South and Central American delegates, but the ministers of Mexico, Colombia, and Guatemala at Washington formally invited the United States to be represented. After some friction in Congress two delegates were appointed, but at the congress 22 June 1826 the American delegates were not present, one having died en route and the other having been delayed in transit. Chile and Brazil approved of the congress but did not send delegates. The congress held 10 sessions, and among other results agreed to a perpetual union for defense against Spain.

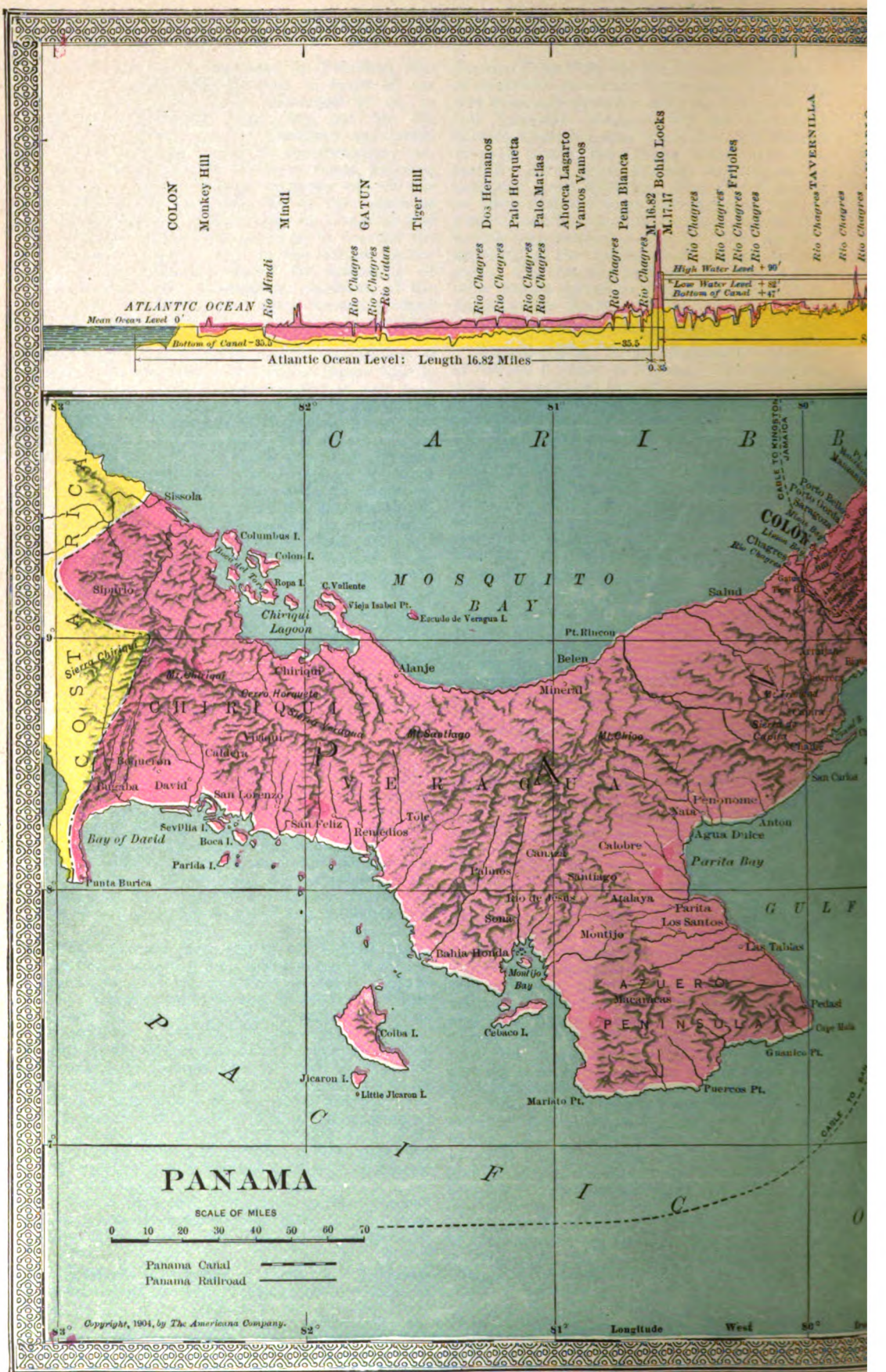
Panama Hats. See HATS AND HAT MAKING.

Panathenæ'a, Greek festivals, celebrated at Athens in honor of Athena. The Panathenæa were distinguished into the greater and the less, in both of which three kinds of games were exhibited, conducted by 10 presidents. On the first day were races with torches in the Ceramicus; on the second, gymnastic exercises, and imitations of naval fights; on the third, contests of music and declamation, and dramatic representations. An olive crown from the groves of Academus and a vessel full of sacred oil were the rewards of the victor. Then followed the sacrifices and the sacrificial feasts.

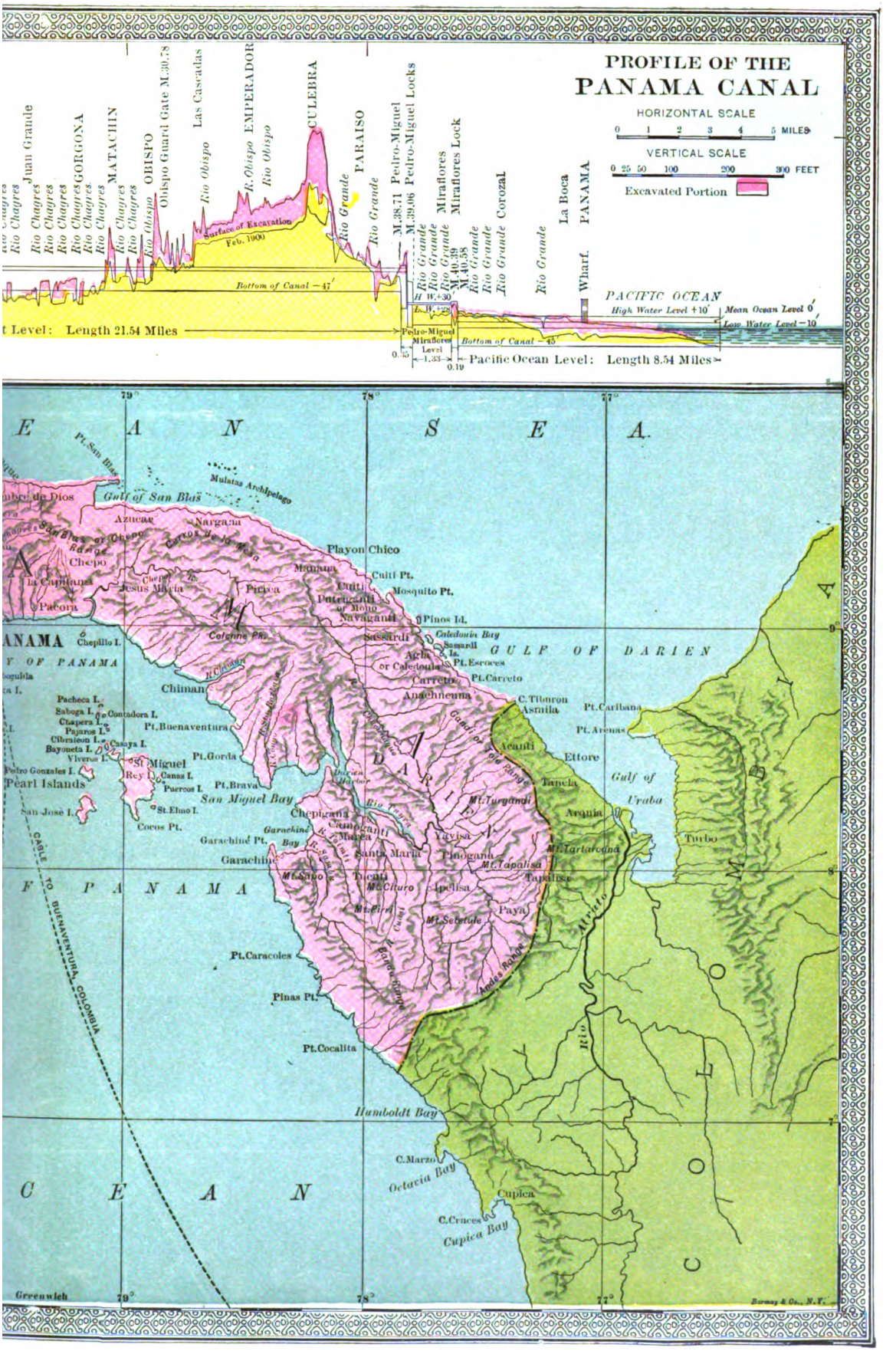
Panay, pä-nī', Philippines, the most northwestern island of the Visayan group, lying a little to the southeast of the centre of the archipelago, bounded on the east by Iloílo Strait, and on the west by Mindoro Sea; area 4,752 square miles, with dependent islands 5,103 square miles. The largest of the dependent islands is Guimarás (243 square miles), lying to the southeast of Panay.

Topography.—The shape of the island is roughly triangular. A mountain range extends from the peninsula of Buruanga in the northwest to the extreme south, and from Maymagui Mountain, in the centre of this range, another mountain system extends to the east and north. The island is thus naturally divided into three provinces. There are three large rivers, the Panay, Jalaur, and Aclán, and numerous smaller streams. The coast on the east and north is well indented with bays and harbors, 15 of which afford safe anchorage for vessels of all sizes; the best harbor is at Iloílo.

Industrial Resources.—The chief industry of Panay is agriculture; cotton, corn, chocolate, pepper, coffee, tobacco, sugar, rice, and copra are raised; the last three are the staple crops, and of excellent quality. The maximum shipment of sugar was in 1892, amounting to 177,467 tons; in 1899, during the insurrection, the amount of sugar shipped was 77,641 tons, and of copra 636 tons. There are also large numbers of live stock raised, cattle, carabaos, and horses, excellent grazing lands being found in all parts of the island. The horses raised in the province of Iloílo are very highly prized throughout the archipelago. The forests are valuable; among the more important woods are molane, ebony, and sibucao, large quantities of which are exported; honey, wax, and pitch are also gathered in considerable quantities. The mineral resources have not been scientifically developed; gold is found and is mined in small quantities; and fine marbles and tonalite are quarried to



COLON
Monkey Hill
Mindi
GATUN
Tiger Hill
Dos Hermanos
Palo Horqueta
Palo Matias
Ahorca Lagarto
Vamos Vamos
Pena Blanca
Bohio Locks
M.16.82
M.17.17
Frijoles
TAVERNILLA
Rio Mindi
Rio Chagres
Rio Gatun
ATLANTIC OCEAN
Mean Ocean Level 0'
Bottom of Canal -35.5
High Water Level +90'
Low Water Level +82'
Bottom of Canal +47'
-35.5'
0.35
Atlantic Ocean Level: Length 16.82 Miles
CARIBBEAN
MOSQUITO BAY
COSTA RICA
CHIRIQUI
VERAGUA
PACIFIC
GULF
AZUERO PENINSULA
Sissola
Columbus I.
Colon I.
Ropa I.
C. Valiente
Vieja Isabel Pt.
Escudo de Veragua I.
Chiriqui Lagoon
Sipurio
Sierra Chiriqui
Mt. Chiriqui
Chiriqui
Cerro Horqueta
Sierra Veragua
Alanje
Pt. Rincon
Belen
Mineral
Mt. Santiago
Mt. Chico
Salud
Chagres
Rio Chagres
Porto Bello
Porto Gorda
Saragossa
Mindi Bay
Limon Bay
Gatun
Tiger Hill
Arraijan
Chorrera
Capira
Sierra de Capira
Chalbe
San Carlos
Penonome
Nata
Anton
Agua Dulce
Parita Bay
Calobre
Canaza
Palmos
Santiago
Atalaya
Parita
Los Santos
Rio de Jesus
Sona
Montijo
Las Tablas
Bahia Honda
Montijo Bay
Macaracas
Pedasi
Cape Mala
Guanico Pt.
Puercos Pt.
Mariato Pt.
Cebaco I.
Coiba I.
Jicaron I.
Little Jicaron I.
Bay of David
Sevilla I.
Boca I.
Parida I.
Punta Burica
Caldera
Boquerón
Bugaba
David
San Lorenzo
San Feliz
Remedios
Tole
Cable to Kingston Jamaica
Cable to Bahia
PANAMA
SCALE OF MILES
0 10 20 30 40 50 60 70
Panama Canal
Panama Railroad
Copyright, 1904, by The Americana Company.
Longitude West


PROFILE OF THE
PANAMA CANAL
HORIZONTAL SCALE
0 1 2 3 4 5 MILES
VERTICAL SCALE
0 25 50 100 200 300 FEET
Excavated Portion
Rio Chagres
Juan Grande
GORGONA
MATACHIN
OBISPO
Obispo Guard Gate M.30.78
Las Cascadas
Rio Obispo
R. Obispo
EMPERADOR
CULEBRA
PARAISO
Rio Grande
M.38.71 Pedro-Miguel
M.39.06 Pedro-Miguel Locks
Miraflores
Miraflores Lock
M.40.38
M.40.85
Corozal
La Boca
PANAMA
Wharf.
Surface of Excavation Feb. 1900
Bottom of Canal — 41'
H W +30
L W +28
PACIFIC OCEAN
High Water Level +10'
Mean Ocean Level 0'
Low Water Level — 10'
Pedro-Miguel Miraflores Level
Bottom of Canal — 45'
t Level: Length 21.54 Miles
Pacific Ocean Level: Length 8.54 Miles
0.35
1.33
0.19
EASTERN
Pt. San Blas
Gulf of San Blas
Mulatas Archipelago
Azucar
Nargana
San Blas or Chepo Range
Cordillera de la Mesa
Chepo
Playon Chico
Cuiti Pt.
Mosquito Pt.
Pinos Id.
Pacora
Chepillo I.
Cafenne Pto.
Sassardi
Caledonia Bay
Agla or Caledonia
Pt. Escoces
Pt. Carreto
Chiman
Amachnenna
C. Tiburon
Asmila
GULF OF DARIEN
Pt. Carlisana
Pt. Arenas
Pacheca I.
Saboga I.
Contadora I.
Chapera I.
Pajaros I.
Cibraleon I.
Casaya I.
Bayoneta I.
Pt. Buenaventura
Pt. Gorda
Acanti
Ettore
Gulf of Uraba
Tanela
Arquia
Turbo
Viveros I.
St. Miguel
Rey I.
Canas I.
Puercos I.
Pt. Brava
Pearl Islands
San Miguel Bay
Pedro Gonzales I.
San José I.
St. Elmo I.
Cocos Pt.
Chepigana
Garachine Bay
Garachine Pt.
Garachine
Mt. Turgandi
Mt. Tartarona
Mt. Tapalisa
Tapalisa
Mt. Sapo
Mt. Churo
Mt. Fire
Mt. Setetule
Paya
Pt. Caracoles
Pinas Pt.
Pt. Cocalita
Humboldt Bay
C. Marzo
Octavia Bay
Cupica
C. Cruces
Cupica Bay
CABLE TO BUENAVENTURA, COLOMBIA
Andes Range
Greenwich
79°
78°
77°
9°
8°
7°
Bureau & Co., N.Y.

Mau

some extent; there are deposits of gypsum, marl, and iron; quicksilver and copper are also reported. The mechanical industries are well advanced and produce for export; fine fabrics of pineapple fibre, jusi, sinamay, and cotton are manufactured; also sugar sacks, hats, and palm-leaf baskets; the woven fabrics of the province of Antique are especially well known, the looms giving employment to over 12,000 women; lime of good quality is manufactured in Iloílo. The fisheries are also valuable, particularly those of the island of Guimarás. Within the three provinces there are excellent road systems; but as the mountains are almost impassable the trade between provinces is entirely by sea; there is also a large foreign trade, the town of Iloílo being next to Manila in commercial importance.

People and History.—The people of Panay are almost entirely of Visayan race; a few thousand wild Mundos and a few Negritos live in the mountains. This island was a stronghold of the Filipino insurrection; it was first occupied by United States troops in the early part of 1899, when a base of operations was established at Iloílo; the enemy's force in that province was dispersed and order established. Cápiz was occupied in the same year, and San José de Buenavista, the capital of Antique, was taken in 1900; but the American advance was vigorously resisted, and the island was not completely pacified until January 1901. Civil government was established under military control, and public schools put in operation as soon as possible, until the permanent government was organized under the provincial government act of the Philippine Commission in April 1901. The island was divided into three provinces (in accordance with the natural divisions), Antique, Cápiz, and Iloílo; the former Spanish commandancia of Concepcion was consolidated with Iloílo. Pop. 801,900.

Panay, Philippines, a pueblo of the province of Cápiz, island of Panay, situated a few miles inland from the northern coast, three miles southeast of Cápiz, the provincial capital. Pop. 15,500.

Panay River, a river of the province of Cápiz, island of Panay; rises on the eastern slopes of the Tapas Mountains, flows north, and empties into the sea near the town of Cápiz; length, 38 miles. It is one of the most important rivers of the island of Panay, has five chief tributaries, and drains the greater portion of the province of Cápiz. It has a high-tide depth of 13 feet at its mouth, and is navigable for large native craft for a considerable distance.

Panchatantra, păn-cha-tăn'tra, an old collection of apologues and stories in Sanskrit. Vishnusarman is represented as the narrator of the stories and author of the book. The Panchatantra has been frequently revised. Wilson had three widely varying manuscripts before him while he drew up his analysis of the work. Kosegarten, who first edited the Sanskrit text, used 11 varying manuscripts. In these he recognized two versions, one simple, the other more extended and elaborated. Neither of these can be the first form of the work, which must have been a still more ancient text.

Some of the apologues contained in the Panchatantra occur in the Mahabharata, others originate in Buddhist books, and several abridgments or imitations occur elsewhere in the Sanskrit.

The 'Panchatantra' is one of the works styled in India as 'Nitishastras' (*shastra,* "book of knowledge," and *niti,* "conduct"), written for the instruction of kings and all those called to take a share in the government. The five books of which it is made up form as many distinct sections related to each other by a preface in which a king, after taking the advice of his councillors, entrusts to a Brahman the training of his three sons. The Brahman composes the Panchatantra for the edification of the young princes, and by the reading of that work he succeeds in overcoming their idleness and in developing their minds.

The first book has for its title 'Mitrabheda' ('The Disunion of Friends'). It aims at acquainting kings with the danger incurred by lending ear to the insinuations of those who seek to sow divisions between a prince and his faithful subjects. The second book 'Mitraprapti' ('The Acquisition of Friends') shows how advantageous it is for men to unite and help each other. The third book, 'Kakolukiya' ('The War of the Crows and the Owls') demonstrates the danger of trusting to untried men or to enemies. The fourth, 'Labdhapranasana' ('The Loss of Acquired Good') proves that we frequently lose by imprudence what we had acquired with difficulty. The fifth and last book, 'Aparikshitakaraka' ('Inconsiderate Conduct'), shows the danger of being precipitate. The narrative is interspersed with sentences, maxims, thoughts, extracts from legal codes, poems, and dramas.

Consult: Kosegarten, 'Panchatantrum' (1848–59); Lancereau, 'Pantchatantra,' French version (1871); Schmidt, 'Pancatantra, Textus Ornatior,' German version (1901).

Pan'coast, Henry Spackman, American educator: b. Germantown, Pa., 24 Aug. 1858. He was educated at the Germantown Academy, studied law, and was admitted to the bar in 1882, but retired from practice in 1887 to devote himself to teaching. He has published 'Representative English Literature' (1892); 'Introduction to English Literature' (1895); 'Introduction to American Literature' (1898).

Pan'cras, Saint, or **Pancratius** ("Victor in every game") a Christian martyr, who at the age of 14 defied the decree against Christianity issued by Diocletian and was accordingly put to death (304). There are many churches dedicated to him in England, Italy, France, and Spain, and his festival is celebrated on the anniversary of his death (12 May).

Pan'creas, a lobulated racemose gland situated behind the stomach, lying in a nearly straight manner across the spinal column, at the level of the first lumbar vertebra or that of the loins. The head and broader portion or right extremity lies with a loop or curve formed by the duodenum or first portion of the intestinal tract (see INTESTINE); while the tail or narrower part or left extremity, is in apposition with the spleen. In man the pancreas is about eight inches long, in thickness it may vary from a half inch to an inch or more; its average breadth being about 1½ inch. Its weight is usually three ounces or over. The splenic vein and splenic artery pass along its upper border, while the lower border rests upon the transverse portion of the duodenum. Behind, the pancreas is in contact with the vena cava inferior, with the

kidney of the left side and its supra-renal capsule, and with the portal vein at its commencement. The duct or excretory tube of the pancreas passes from the right to the left of the structure in the front, and at the lower or inferior edge of the gland.

The diseases of the pancreas are few, and do not betray their presence by any very marked symptoms. The most common form of disease is cancerous deposit in the head of the gland, which frequently induces jaundice by obstructing the common biliary duct near its opening. An accurate diagnosis of disease of this organ is extremely difficult, and cannot lead to efficient treatment; all that can be done in these cases being to palliate the most distressing symptoms. The pancreas of ruminating animals is a favorite article of food under the name of sweetbread. See ANATOMY, COMPARATIVE; DIGESTION.

In bears, dogs, and many other *Mammalia* the pancreas exhibits a structure more complicated than that found in man. In rodents, in the hedgehog and flying fox, etc., it exhibits a branched or arborescent structure. In the horse and pig it is trilobular. In the ox it is invariably and in man sometimes double. In birds the sweetbread is narrow and elongated, lies within the duodenal loop, and possess usually two ducts. The pancreas of reptiles and amphibia presents no features worthy of special remark. In certain fishes a pancreas exists, but its place in the generality of fishes appears to be filled by a greater or less number of cæcal appendages (the pyloric cæca), which are attached to the pyloric or hinder aspects of the stomach. In the sword-fish these cæca become aggregated together so as to form a pancreatic-like structure. In the lancelet no pancreas or homologous organ exists. In *Invertebrata* certain organs connected with the digestive system have had a pancreatic function assigned them. In gasteropodous mollusks it makes its first definite structural appearance as a long glandular sac.

Pancreatin, a substance secreted by the pancreas, and often administered, in medicine, for the correction of certain digestive disorders. The commercial supply that is used in medicine is mostly obtained from the pancreas of the hog, and is best known in the form of a grayish, amorphous powder, usually with a tinge of yellow, and with a faint, characteristic smell. Pancreatin is not a definite chemical substance, but contains several distinct ferments. Its composition varies, moreover, with the source from which the substance is prepared, and with the state of activity of the particular pancreas from which it is extracted. One of its normal components, steapsin, is an exceedingly powerful agent for effecting the emulsification of fats, and it is even able to partially separate them into free glycerin and free fatty acids. Another constituent, trypsin, converts coagulated albuminous substances into soluble peptones, resembling pepsin in this respect, although its action is somewhat different. Pancreatin, for example, is effective only in an alkaline medium, while in the case of pepsin the medium must be acid. Another constituent, amylopsin, converts starches and other amylaceous substances into sugars; and a fourth ferment that is present possesses the power of coagulating the casein of milk.

Pan'da, or **Wah,** an animal (*Ælurus fulgens*) of the raccoon family, which inhabits the eastern Himalayas to a height of about 12,000 feet. It is equal in size to a large cat, and has remarkably glossy reddish-chestnut fur, darker below, with a white face and a long ringed tail. It seems to be the remnant of a once very widespread group which in the early Tertiary Period was numerous in Europe, explaining the present curious distribution of the family, for all other existing raccoons are American. The animal is described as inhabiting forests and feeding almost entirely on vegetable food; but it eats eggs and insects when it can get them. Most of its time is spent upon the ground, but it has semi-retractile claws and is able to climb trees. It is said to be rather a dull-witted, defenseless creature, reminding one of the kinkajou. Consult: Flower and Lydekker, 'Mammalia' (1891); Blanford, 'Fauna of British India: Mammals' (1888).

Pandan, pän-dän', Philippines, a pueblo of the province of Antique, island of Panay; on the west coast near the Bugang River; 66 miles north of San José de Buena Vista. It is on the coast road, and has a good anchorage ground. Pop. 13,800.

There is a small pueblo of the same name (pop. 2,143) on the north coast of Catanduanes Island, near Albay, Luzon.

Panda'nus. See SCREW-PINE.

Pandarus, păn'da-rŭs, Trojan hero, son of Lycaon. He was given by Apollo a bow with which he became famous as an archer. In the war between the Greeks and Trojans he broke the truce, and after wounding Menelaus and Diomedes was slain by the latter. He also appears in Shakespeare's 'Troilus and Cressida' as a procurer, whence the English word "pander."

Pandavas, pän'da-vaz. See MAHÁBHÁRATA.

Pan'dects, The, the most important compilation of the Roman law, prepared by several scholars at the order of the Emperor Justinian (q.v.). It is also called 'The Digest.' It was an attempt to form a complete system of law from the commentaries of the great jurists. The work was done by a committee of the jurist Tribonianus and 16 others learned in law; it was begun in 530 A.D. and completed in 533. The magnitude of the task becomes apparent from the fact that about 2,000 various treatises were consulted, and from these about 9,000 extracts appear. One third of them comes from Ulpian, one sixth from Paulus, one twelfth from Papinianus, and the rest from 36 other writers. The Pandects, with the Codex Justinianus, became the law for the Roman empire. When the Lombards invaded Italy in 568, they overturned almost all the few remaining Roman institutions, the law courts among them. In Ravenna, however, the Roman law was still taught; and the Lombards allowed their Roman subjects to be judged according to the Roman law. The Codex, which begins with an invocation to the Trinity, and contains a great deal of legislation on ecclesiastical matters, was held in esteem by the clergy; but the Pandects were at first ignored, as being the work of pagan jurists. In the last part of the 11th century, however, there was a great revival of the study of Roman law. Irnerius of Bologna, the greatest teacher of his time, renewed the study of the Pandects, which, together with the Codex, became the basis of all

mediæval legislation. The Pandects may justly be considered the most famous collection of law ever made. In both its central idea of codification and its content and phraseology it has profoundly influenced subsequent legislation, including that of New England and the United States.

Pando'ra, in Greek mythology, the first woman; so called because she received gifts from all the Olympians. She was the creature of Prometheus, and the gods came down to see her, and conferred their gifts on her. Athena instructed her in all works of female skill. Aphrodite endowed her with beauty and fascination. Hermes inspired her with a desire of pleasing, and taught insinuating words. Athena carried her thus equipped into the assembly of the gods, and all admired the work. She became the wife of Epimetheus, a mortal, brother of Prometheus, and brought sorrow into the world by opening, in her curiosity, a box containing the blessings of life; all these escaped, save Hope. This is clearly a late and philosophic addition to the myth.

Pandours, păn'doorz, or **Pandoors,** the name formerly given to the Servian or Raitzian foot-soldiers coming from the village of Pandur, in the county of Sol, in Lower Hungary. They were at first irregular troops. In 1750 they were made regular troops.

Pan'el, (1) in law, a schedule, or roll of such jurors as the sheriff returns to pass upon any trial; and impaneling a jury is returning their names in such schedule of parchment. In Scottish law the prisoner at the bar is the panel. (2) In carpentry, a tympanum or square piece of thin wood, sometimes carved, framed, or grooved in a larger piece, or between two upright pieces and two cross pieces. (3) In masonry, a face of hewn stone. (4) In bookbinding, a depressed part of the sides within a relatively elevated bordering portion; or a space on the back between bands. (5) In mining, a system of coal mining in which the projected winning is divided into large, square allotments, divided by massive walls of coal, instead of placing the whole working in one undivided arrangement. The pillars are left very large, the rooms small; the pillars are worked out, props being substituted; these are knocked out, and the goaf filled up by the caving down of the ceiling. (6) In painting, a piece of wood — oak, chestnut, or white poplar — on which, instead of canvas, a picture is painted. The earliest paintings in oil were generally executed on panels, which were composed of various pieces of wood, cemented together with cheese glue; and this glue, or cement, caused each portion to adhere so firmly that such panels were considered stronger than those which consisted of one piece of wood only.

Pangasinán, păn-gä-sē-nän', Philippines, a province of the Island of Luzon, in the western central part of Northern Luzon at the head of the Gulf of Lingayen; length, east and west, 56 miles; width, 33 miles; area, 1,316 square miles. The province is mountainous in the northeast, and also near the western boundary; the rest of the surface is flat, sloping toward the sea, and near the coast is very low and frequently inundated by the rivers. There are numerous rivers, of which the Agno is largest and most important. The staple crop is rice, though this is often injured by floods; sugar, corn, tobacco, and cocoanut are also abundantly cultivated; the nipa palm grows luxuriantly. There are abundant deposits of salt, and also gold, copper, iron, magnetite, and sulphur. The important industries besides agriculture include the making of nipa wine, the weaving of burí, and manufacture of mats, hats, and sacks, and boat building. The Gulf of Lingayen affords excellent commercial facilities; the commerce is carried on almost wholly by the Chinese. Many of the rivers are navigable for some distance; well constructed roads extend all over the province, and the Manila & Dagupan Railroad also crosses the province. Pop. 302,178, mostly Pangasináns.

Pangasináns, a group of tribes of the Philippine Islands inhabiting the province of Pangasinán, Luzon and some localities in the province of Zambales, Nueva Ecija, and Benguet. They are of the Malay race, and at the time of the arrival of the Spaniards had a civilization and written language of their own. Their language is now generally spoken in the province of Pangasinán. They are Christians.

Pangen'esis, a theory advanced by Darwin to account for the phenomenon of heredity, and especially to explain the (alleged) inheritance of acquired characters (effects of use and disuse of parts) which formed the basis of the theory of evolution of Lamarck. (See LAMARCKISM.) The problem was to form a hypothesis by which changes in any part of the body could so affect the germ-cells that the parental peculiarities should re-appear in succeeding generations. Darwin supposed that every cell of the body gives off at every stage of its existence minute particles, or gemmules, which when furnished with proper nutriment will give rise to parts similar to those from which they were derived. These gemmules are collected from every part of the body to form the sexual elements, and their development in the next generation forms a new being. To explain the fact that characters may skip a generation he assumed that the gemmules may lie dormant for a time. This theory was weak in that it assumed the existence of particles of which we have no other evidence, and it was shortly disproved by Galton. If these gemmules are constantly given off they must be carried by the blood and hence if introduced into another animal they must effect the progeny. Galton introduced into the blood of silver-gray rabbits the blood of rabbits of other colors, in some cases to the extent of half the blood, but the offspring invariably showed no trace of change of color. Brooks in his 'Heredity' (1883) modified the theory so as to avoid Galton's experiment, but the theory has been dropped in later years, and has only a historic interest. Consult: Darwin, 'Variation of Animals and Plants under Domestication' (1868), and the authorities mentioned under HEREDITY.

Pango-Pango, păng'gō-păng'gō, or **Pago-Pago,** a harbor on the south coast of the island Tutuila, Samoa. It is L-shaped, with the greatest length (17 miles) from east to west. It is land-locked and in every way one of the finest harbors in the Pacific. It was ceded to the United States as a naval and coaling station in 1872, and the cession was confirmed by a treaty signed in 1878, by which the United States was given the right to establish at the

harbor a station for coaling, naval supplies, freedom of trade, commercial treatment as a favored nation, and extra-territorial consular jurisdiction. It was occupied by the United States in 1898, with the purpose of utilizing its advantages as a coaling and supply station; and by the agreement of 1899, the island of Tutuila came into the possession of the United States. See SAMOAN ISLANDS.

Pan'golin, or **Scaly Ant-eater.** See MANIS.

Pangutárang, päng-oo-tä'räng, a group of islands of the Sulu Archipelago, lying in the Sulu Sea, northwest of the island of Sulu and west of Mindanao. The group includes 13 islands of which the two largest are Pangutárang, 44 square miles, and Panducan, 14 square miles; the area of the whole group is 72½ square miles. The islands are moderately high, and are very heavily wooded. The chief industries are fishing, and agriculture which is carried on in the rudest and most primitive manner. The island of Pangutárang is low and level; it is thickly populated and carries on a considerable trade with Sulu.

Pan'han'dle, The, a long, narrow strip of land, resembling the handle of a pan, generally projecting from a State or Territory, as the Panhandle of West Virginia, or the Panhandle of Idaho. There is also a well-known projection in Texas called the Panhandle.

Panic, in finance and commerce, a word denoting insecurity and danger to money values and credits. When a panic occurs the banks are besieged by depositors, money is hoarded and general financial distrust ensues. The word is also applied to sudden displays of terror and alarm at public gatherings, theatres, etc., as in case of fire. The most noted financial panics since 1750 were as follows:

1763 Amsterdam. Heavy failures in Holland, England, and Hamburg.
1773 Holland. Failures exceed $50,000,000.
1793 England, owing to French war. Government issued $25,000,000 Exchequer bills.
1799 England. Panic at Liverpool. Government lent $2,500,000 in Exchequer bills on goods. Eighty-two failures at Hamburg.
1814 England. 240 banks stopped payment.
1825–1826 England. 770 banks stopped payment owing to failure of South Sea bubble companies. Owing to the distress occasioned by the consequences of this panic, families in Yorkshire were reduced in 1829 to live on bran. From the same cause about 200,000 families emigrated to the Continent, America, etc., in four years.
1831 Calcutta. Failures, $75,000,000.
1837 United States. "Wild Cat" crisis.
1847 England. Owing to excessive railway speculation. Failures, $100,000,000. Discount rate, 13 per cent.
1857 United States. Failures $555,000,000. Minor crisis in England.
1866 London. Owing to over-speculation. Total failures, above $500,000,000. The last of the serious panics.
1873 United States. Heavy failures in New York and elsewhere.
1884 Grant & Ward and Marine Bank failures.
1885 London. Much temporary disturbance owing to expected Russian war.
1890 London. Baring crisis. Liabilities guaranteed by English banks.
1892 Financial crash in Australia.
1893 United States. The silver crisis, also by some attributed to fear of changes in tariff by the Democratic party.

See also BANKS AND BANKING; FINANCE.

Panicum, an important genus of grasses, the millets. See GRASSES OF THE UNITED STATES.

Panini, pä'nĭ-nĭ, Indian philologist: b. Salatura (near modern Attock), Punjab, 4th century B.C.; probably the oldest writer on grammar whose works are extant, although he quotes the names of 64 predecessors. He is reckoned among the sages of the Puranas. Nothing is known of his life. His grammar is in eight books, divided into chapters, and containing 3,996 rules or sutras. Its method is wholly different from that of European grammarians. The separate chapters treat the various phenomena of language as they appear in all the various forms of speech; hence the work is strictly a philosophical treatise, requiring to be studied as a whole, and not conveying sectional information in a form classified for reference according to the European model. His style is condensed, obscure, and difficult to the Western student. He is the first who has classified the philological principles of grammar, as distinguished from the mere forms or parts of speech. He did not treat of syntax, and inflections are not formally given, but must be obtained by a collation of separate rules. The grammar of Panini has been often annotated. Its chief critic is Patanjali (q.v.). The chief edition of Panini is by Bothlingk (1887), and that of Pataniali's 'Great Commentary' by Kielhorn (1878–85).

Panipat, pän-i-pŭt', or **Paniput,** India, town in the district of Karnal, Panjab, about 52 miles north of Delhi, on the Grand Trunk and the East I. R.R.'s. It is a strategic centre; and was the scene of the negotiations of Duryodhana and Yudishthira at the beginning of the 12th century B.C., of the Mogul victory of Baber over Ibrahim Lodi, which established the Mogul power in north India in 1526, of Akbar's victory over the Afghans in 1556, which reassured the existence of the Mogul empire, and of the Afghan victory of 1761 over the Mahrattas, which prepared the way for English rule. It exports a coarse sugar. Pop. (1901) 26,914.

Panitan, pä-nē'tän, Philippines, a pueblo of the province of Cápiz, island of Panay; on the Malinannang River, seven miles south of Cápiz, the provincial capital. Pop. 10,020.

Panizzi, pä-nēt'sē, SIR **Anthony,** English librarian: b. Brescello, Modena, 16 Sept. 1797; d. London 8 April 1879. He was educated at Reggio and the University of Parma. Having taken part in revolutionary movements, he went to England in 1822, and became professor in Italian in University College in 1828. In 1837 he was appointed keeper of printed books in the British Museum, succeeding to the principal librarianship in 1856. He contributed very largely both to the increase of the number of books and to the cataloguing and general arrangement of the library and designed the vast reading-room and its annexes. He edited Boiardo's 'Orlando Innamorato'; Ariosto's 'Orlando Furioso'; and Lord Vernon's reprint of Dante's 'Divine Comedy' (1858). Consult Fagan, 'Life of Panizzi.'

Panjab, pŭn-jäb', **Punjab,** or **Punjaub.** See PUNJAB.

Panjan'drum, the name applied to an imaginary personage of power and influence; a burlesque monarch or Great Mogul. The word was originally coined by Samuel Foote in a long string of rigmarole as a test for Macklin who boasted of his memory. It is also called the Grand Panjandrum.

Panjnad. See PUNJNUD.

Panmix'ia, in the theory of organic evolution, the cessation of the operation of natural selection. The process of the survival of the fittest, says Parker, has a reverse side, which has been termed the elimination of the unfit. Of the varieties that appear, some are less completely adapted to their surroundings than the majority, and these (the conditions remaining the same) tend to become destroyed owing to their unfitness to cope with their environment. The result of this process of elimination (apart altogether from the selection of progressive variations by which evolution, according to the theory, proceeds) is to keep up a certain standard of efficiency in the organs of the members of the species. Under certain conditions this *sustaining* influence, as we may term it, of natural selection may be suspended; the organism may be placed under conditions in which natural selection acts with reduced effect or does not act at all. There is, under such circumstances, no "elimination of the unfit"; and, as a result, fit and unfit survive indiscriminately, inter-breed, and produce offspring, the ultimate outcome in the course of generations being a gradual deterioration in the whole race.

This suspension of the influence of natural selection or *panmixia,* acts more commonly on single organs than on the entire organism. Thus, if, owing to some change in surrounding conditions, an organ is no longer kept up to the previous degree of efficiency by the elimination of the individuals in which the organ in question is imperfectly developed, and, as these cross with one another, offspring is produced in which the organ is below the efficient standard; and by a continuance of this process through a series of generations, it is supposed that the organ gradually dwindles in size, and may altogether disappear. The cetaceans furnish good examples of the process. Consult Parker and Haswell, 'Text-book of Zoölogy' (1897).

Pannonia, pa-nō'nĭ-a, in ancient geography, a Roman province on the Danube, including what is now western Hungary, Slavonia and Bosnia, eastern Austria and Styria. Neither of the origin of the name nor of the inhabitants, the Pannonians, is anything certain known, but the people may have been of Illyrian stock with an admixture of Celtic due to a Celtic invasion in the 4th century B.C. They were conquered by the Dacians about 50 B.C. Octavian defeated them in 35–34 B.C., but they rose a generation later and Pannonia was finally conquered in 9 A.D., but not occupied save on the frontier until 102–107 A.D., by Trajan. The principal cities planted by the Romans were Vindobona (Vienna), Carnuntum (near Deutsch-Altenburg), Savaria (Szvonbathely), Arrabona (Raab), Siscia (Sissek), Poetovio (Pettau), Aquincum (Altofen), and Sirmium (Mitrovitza). Trajan divided the province into a lower and an upper Pannonia. In the beginning of the 5th century Valentinian III. of the Western empire ceded Pannonia to Theodosius II. of Byzantium, who surrendered it to the Huns. It was occupied by the Ostrogoths about 450 A.D., by Theodoric of Italy in 488, by the Lombards in 527, and by the Avars in 568. Then came the influx of the Slavs. Consult Jung, 'Römer und Romanen in den Donauländern' (1887).

Pano (pä'nō) **Indians,** a South American tribe living along the banks of the Ucayali and Huallaga rivers in Peru. They were formerly very numerous but now number less than 2,000. During the 17th century the missionaries persuaded many of them to gather in the mission villages. They were of a rather low grade, but understood hieroglyphic writing on bark. When the missions were broken up, in 1767, most of the Panos returned to their savage life, forming numerous small tribes. They have always been friendly to the whites. They are expert boatmen and build canoes some of which are 40 feet in length.

Pano'an Indians, a South American family comprising upward of 20 tribes and occupying the forest regions of Peru, Bolivia and Brazil. Among the better known tribes are Cashibo, Conibo, Mayoruna, Pano, Remo and Setebo. They are a savage race in all that the name implies and several of the tribes practise cannibalism. They have steadily decreased in number during recent years.

Panora'ma, a picture representing a wide or general view, as of a large tract of country, so exhibited a part at a time by being unrolled and made to pass continuously before the spectator. It was invented in England in 1787 by Robert Barker. See also CYCLORAMA.

Panpipe, an ancient wind instrument, undoubtedly the precursor of the organ (q.v.). It was formed of seven, eight, or nine short hollow reeds, fixed together by wax, and cut in graduated lengths so as to produce a musical scale. The lower ends of the reeds were closed, and the upper open and on a level so that the mouth could easily pass from one pipe to another.

Panslav'ism, a general name for the efforts of the Slavonic races in Europe for a unity of civilization and literature. An anonymous work, the European Pentarchy (1839). and the writings of A. Gurovski, made a considerable impression in favor of a union under Russia; while later events favored the Austrian headship; but none of these projects ever possessed a reasonable chance of realization. The mere fact that the Slavonic race comprises nations so bitterly hostile as Russia and Poland, not to speak of geographical and political difficulties, and of such diversities of religious creed as are contained within the range of Christianity and Mohammedanism, made any attempt to unite the scattered elements of such a race in a voluntary political union impracticable. For similar reasons little more real progress has been made with the attempt to promote a literary union.

The most important effort put forth toward the realization of a political union of the Slavs was in 1848, when, stimulated by the rival efforts at union of the German nations, and especially by the summons to Bohemia to send her full contingent to the German parliament, the Slavonic clubs summoned a congress of all the Slavs in the Austrian Empire, with a view to confer on the constitution of the empire. The congress met at Prague on 2 June. The various nations represented were classified in three departments: the first, consisting of the Bohemians, Moravians, Silesians, and Slovaks or Western Slavs; the Poles and Ruthenians forming the Eastern Slavonians; the Slovenians, Croats, Servians, and Dalmatians the southern

division. Each of these divisions chose 16 members, who formed a committee, with Palacky at their head, who drew up a plan of confederation and alliance among the various nationalities of the empire. The proceedings of the congress, however, which had to be conducted in German, as the only common means of communication, could not be brought to a formal conclusion, and the congress was interrupted by a Slavonic insurrection, which proved futile. Since 1866 renewed but unavailing efforts have been made by the scattered Slavonians of Austria to form a union among themselves, in order to counterbalance the preponderance of the German and Magyar races.

Pansy, an annual or imperfectly perennial herb (*Viola tricolor*) of the order *Violaceæ*. It is a native of Europe where it has been in cultivation for at least 400 years, and whence it has been taken to all cool temperate climates of the civilized world. The plant, which is rarely more than six inches tall, bears long-petioled, heart-shaped leaves, and large irregular flowers which slightly resemble the human face. Its name is a corruption of the French, *pensée*, thought, and its old folk-name, "heart's-ease," signifies remembrance, a double reason for its popularity. Few flowers show the effects of care in selection more than the pansy. Naturally the blossoms are borne upon rather short stalks and are less than a third the size of improved varieties, which often attain a diameter of three inches. In dry climates fresh seed must be imported annually, since home-grown seed even of improved strains is apt to produce flowers inferior to the imported, each year emphasizing the deterioration. The cultivated pansies are grouped in strains rather than as individual varieties, and as a rule exhibit mixtures of blue, white, and yellow, although some kinds are all of one color. Pansies thrive best upon rather heavy loams well drained and well supplied with plant food and humus. In the United States and other countries where the air becomes very dry during the summer, the plants generally fail during the hot months, even when planted in shady places, the most favorable situations. Hence, in such climates the seed is usually sown in cold frames during August or September, kept cool and moist by a rather thick mulch of loose straw until the plants appear, and then these are protected from drying winds. Being tolerably hardy the plants can be left in the frames during winter, previously having been transplanted from the seed-bed so as to stand about two inches apart. In the spring they may be allowed to blossom where they stand or may be transplanted to garden beds as soon as the ground can be worked. After flowering in these beds for a month or six weeks they should be replaced by geraniums or other heat-loving plants.

Pan'theism (Greek, *pan*, all, and *theos*, god), in philosophy, the doctrine of the identity of God and the material world. The doctrine stands midway between atheism and dogmatic theism. There are only three ways in which the philosopher can deal with the idea of the existence of God, that is, of a being who is the cause or original sum of all being. He may deny his existence altogether, or may infer psychologically that there is a God, and proceed to the inference that he is the first cause of all things, but leave unexplained the nature of the relation between God as cause and other existences as effects. Finally, he may proceed to reason back from the effect to the cause, and show a necessary connection between them. The last process is the source and explanation of pantheism. The origin of the idea of a God with the theist and the pantheist is the same. It is by reasoning upon ourselves and the surrounding objects of which we are cognizant that we come to infer the existence of some Superior Being upon whom they all depend, from whom they proceed, or in whom they subsist. Pantheism assumed the identity of cause and effect, and the consequent adequacy of each effect, rightly interpreted, to indicate its cause. Matter, not less than mind, is with it the necessary emanation of the deity. The unity of the universe is a unity which embraces all existing variety, as proceeding from it in a way necessarily explicable by the result. Hence each existing thing contains all the explanation of its own existence which it is capable of receiving.

The earliest school of Greek philosophy, the Ionian, in as far as it admitted any theism, was essentially pantheistic; and to the same school of pantheism belong Epicurus and Lucretius in ancient, and Giordano Bruno in modern times. The atomic theory, or the origination of all things in conscious atoms, is the culminating theory of this school. The Sankhya of Kapila, one of the most celebrated Indian systems of philosophy, in which probably originated the Buddhist religion, was the chief representative of pantheistic tendencies in the East. Kapila enumerates 25 first principles of things: of which the first (*mulaprakriti*) is matter; the second (*buddhi*), intelligence; the third (*ahankara*), self-consciousness. Speusippus, the sister's son and successor in the Academy of Plato, might be called an ultra-pantheist. He taught, what may possibly be considered the true logical culmination of the doctrine, that the Divine or Best is first indeed in rank, but is chronologically the last product of development. He defined happiness as the habit of conformity to nature. The soul, according to him, was a higher union of the arithmetical and the geometrical, or extension harmoniously shaped by number. The Stoics, differing widely from the school of Epicurus, may also be numbered among the adherents of pantheism. Their doctrine was that whatever is real is material. The universe as a whole possesses consciousness, and this consciousness is deity. The world undergoes a constant evolution, the elements of water, earth, and air being evolved out of fire, which again absorbs them, and the process recommences in an eternal cycle. The human soul and the deity, which are one in nature, act and react on each other. Intelligence, whether in man or the deity, they considered as consisting chiefly in force. Perhaps there is nothing which seems more opposed to pantheism than the mysticism of the Alexandrian school, and particularly of Plotinus, which makes of God so pure an abstraction that even thought, without being separated from individuality, cannot attain to it. Yet from the bosom of this school a prolific source of pantheism has arisen. Dionysius, the pseudo-Areopagite, a Christian philosopher of the Neoplatonic school, introduced it among his speculations, in which the particular is derived by a series of gradations, as genus and species, from the universal. John Scotus Erigena, the founder

of the scholastic philosophy of the Middle Ages, gave this speculation a realistic turn, making God the essence of the world, and the universal, the genus, the species, and the individual so many particular developments which actually succeed each other. Eckhart, a German philosopher of the beginning of the 14th century, also a disciple of Dionysius, and often regarded as the father of German philosophy, taught some views which were developed in a pantheistic direction by some of his followers. Eckhart held that the works of creation were eternally in God in idea or conception; this was developed into a pantheistic doctrine of the eternal existence of ideas or types of all things. Giordano Bruno, like Epicurus and Lucretius, taught that monads are the elements of all existing things. God is the imminent cause of the universe. Power, wisdom, and love are his attributes; but he is the monad of monads, the minimum because all things are external to him; the maximum because all things are in him. He produces the worlds freely, but by an inner necessity of his nature. The worlds are nature realized; God is nature working. Stars are moved by the souls that reside in them. God is in all things, as being in things that exist, or beauty in objects that are beautiful.

No modern pantheist has acquired a greater renown than Spinoza, probably because none has developed his doctrines into a system so comprehensive, or with a logic so rigorous. A disciple of Descartes, he founds upon that master's definition of cause a system in which he develops the relation of God to the universe in a series of propositions, graduated like a succession of consequential demonstrations in mathematics. According to Spinoza the essence of God is existence, and he has two fundamental attributes, extension and thought. All things which exist are modes of God's attributes. Their existence is necessary, and all changes which take place in them, whether affecting intelligent or non-intelligent beings, are necessary. God alone is free, and he is free because he acts by an inner necessity, and is not controlled by any other being. It may be added that Spinoza combats the apparent inference from his doctrine, that the sum of things which exist is God. Things are diverse, complex, and limited, while God is one, simple, and infinite. They are not God, but only the necessary modes of his attributes. Among modern pantheists a place is also due to Leibnitz. According to him all souls are monads, or atoms containing active powers consisting in ideas. God is the primitive monad; all other monads are its fulgurations. Bodies, as plants and minerals, are aggregations of sleeping monads with unconscious ideas. The relations of the monads are purely mechanical, and their co-operation is determined by the theory of pre-established harmony. (See MIND, HUMAN.) Diderot recognized God in natural law, truth, beauty, and goodness; for Leibnitz's monads he put atoms, and gave them sense in place of ideas, which became thought in organized beings. Finally, the modern doctrine of evolution, when it assumes a transcendental form, and carries speculation as to the origin of things beyond the range of inferences founded on the observation of nature, is necessarily pantheistic.

Pan'theon, anciently a name applied to a temple or shrine dedicated to the gods. The most historical pantheon is that erected in Rome by Agrippa about 25 B.C. and dedicated by him as a temple to all the gods. For 13 centuries it served as a Christian church, having been dedicated by Boniface IV. about the year 607. It is 188 feet in circumference and is covered by a dome 142 feet in span. The entire height is 141 feet. Raphael and Victor Emmanuel II. are buried in the Pantheon. Another noted structure bearing this name is the Pantheon of Paris (Church of Saint Genevieve), for a description of which see PARIS.

Panther, some large cat, in North America usually a cougar; in South America a jaguar; in India or Africa, a leopard.

Panther-cat, a name locally given to several spotted wildcats; most often, probably, to the ocelot (q.v.).

Pan'tograph, an instrument by the aid of which maps, plans, and designs may be copied mechanically, either on the scale on which they are drawn or on an enlarged or reduced scale. It is made in a variety of forms.

Pan'tomime, the name given by the Romans to an actor in a dramatic performance consisting of dance and gesture. This sort of representation appears to have been indigenous to Italy. The modern Christmas pantomime in Great Britain is a spectacular play of a burlesque character, founded on some popular fable, and interspersed with singing and dancing, followed by a harlequinade, the chief characters in which are the harlequin, pantaloon, columbine, and clown.

Pantop'oda, or **Pycnogonida,** a group of marine spider-like, but hard-shelled arthropods, which is classified near the horseshoe crabs (*Limulus*). The body (*cephalothorax*) is so small and the limbs are so large that the animal, which may span two or three inches in large species, seems all legs, and a popular name along the New England coast is "no-body crab." There are four pairs of equally large many-jointed walking legs, in advance of which are two pairs modified into chelate mouth-organs, and a third pair upon which, in the breeding season, the male carries the eggs cemented to these appendages. The abdomen is represented by only a small tail-like part posterior to the legs. A metamorphosis occurs in most species, and the larva looks something like a nauplius, but is not equivalent to it. These curious creatures live from the shore-line to deep water.

Panuco, pä'noo-kō, (1) river of Mexico, rising in the plateau north of the City of Mexico and flowing generally northeast. It forms part of the boundary of Tamaulipas and Vera Cruz and receives the waters of several smaller streams before emptying into the Gulf of Mexico near the city of Tampico (q.v.). Its bar has been removed by elaborate engineering works and the river mouth is now a fair port. (2) A district about this river, so called by Cortez and his followers. It was partially conquered by Cortez in 1522, but in 1526 was granted to de Guzman, who was independent of Cortez.

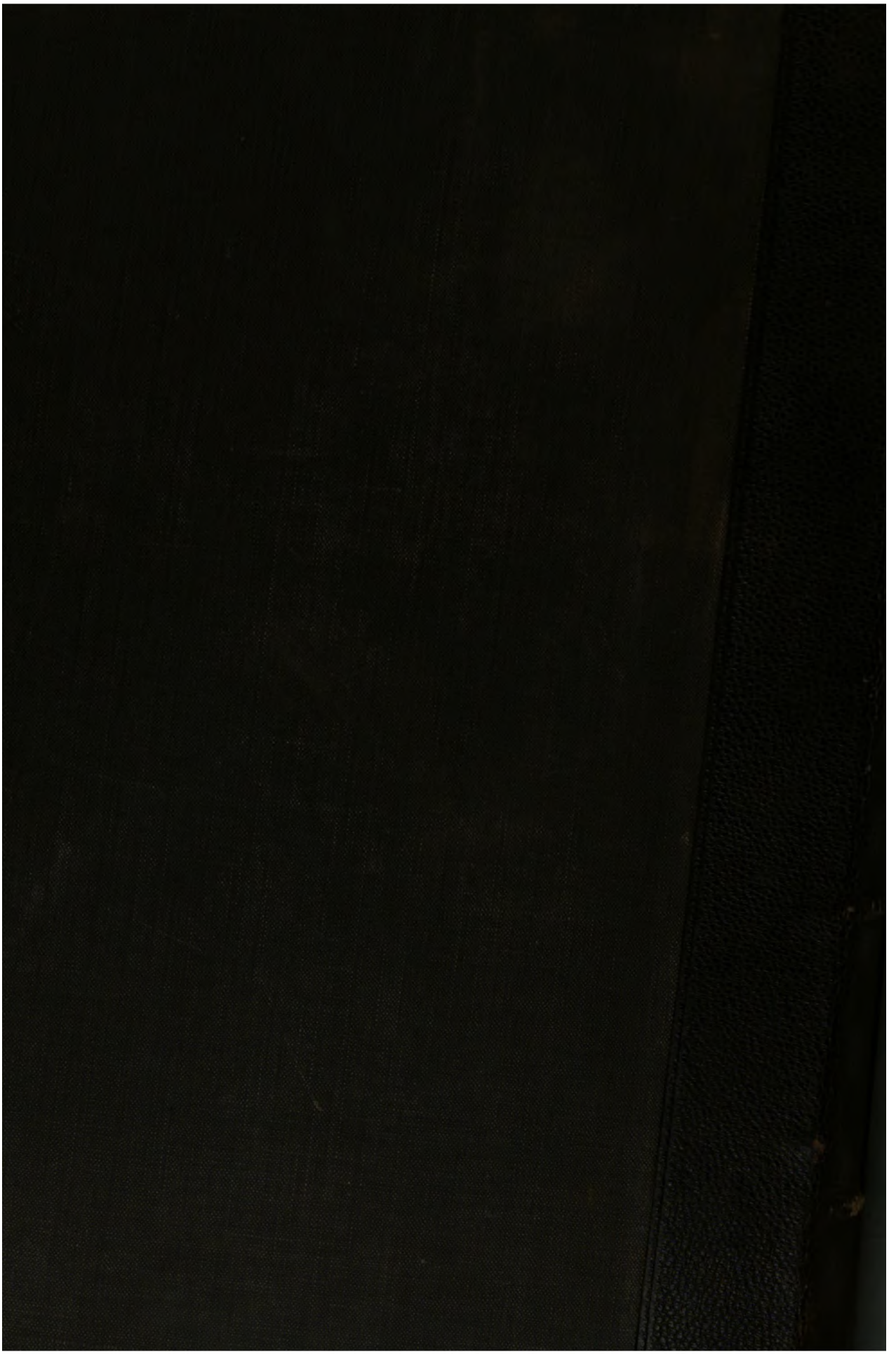
Panyasis, Greek epic poet of the 5th century B.C., ranked one of the five great epic poets of Greece for his poems on Heracles and on the Ionic migration. He was born in Halicarnassus, and is thought to be the uncle of

Herodotus. His few fragments are edited by Kinkel (1877); the most important are on wine, its use and abuse.

Paoay, pä-ō-ī', Philippines, pueblo, province of Ilocos Norte, Luzon, three miles inland from the western coast, on a small lake; 12 miles south of Laoag. It is on the main highway. Pop. 11,850.

Paola, pā'ō-lā, Kan., city, county-seat of Miami County; on the Missouri P., the Missouri, K. & T., and the St. Louis & S. F. R.R.'s; about 40 miles south by west of Kansas City. It was settled in 1855 and in 1869 was chartered as a city. It is in a fertile agricultural country and in a natural gas belt. Coal deposits are in the vicinity; cultivating grain and stock-raising are prominent industries in this section. The trade is chiefly in wheat, corn, live-stock, and coal. It is the seat of the Ursuline Academy, and has public and parish schools and a free public library which contains about 6,000 volumes. Pop. (1890) 2,943; (1900) 3,144.

Paoli, pā'ō-lē, **Pasquale de**, Corsican patriot: b. Morosaglia, Corsica, 26 April 1725; d. near London, England, 5 Feb. 1807. He was educated at the Jesuits' College at Naples, and in 1755 was appointed captain-general by his countrymen, then struggling for their independence against Genoa. By his energetic efforts the government and military resources of the island were reformed, and he maintained a protracted and generally successful struggle with the Genoese. The latter, however, first made an agreement with France to garrison the places held by them in Corsica, and finally, in 1768, sold the island to France. After a brief struggle Paoli was obliged to yield, and fled to England. Here he remained 20 years, till the revolution of 1789, when he was recalled by the national assembly and made lieutenant-general of Corsica. Dissatisfaction with the extreme measures of the revolutionists in France soon led him to throw himself into the arms of England; in 1793 a British army was landed in Corsica, and through his influence the crown was offered to George III., in 1794. Paoli, however, did not obtain the government of the island and withdrew to England and was pensioned by the British government. His remains were removed to Corsica in 1889. Consult Arrighi, 'Histoire de Pascal Paoli' (new ed. 1891).

Paombong, pā-ōm-bōng', Philippines, pueblo, province of Bulacán, Luzon; on the central delta outlet of the Pampanga River; two miles west of Malolos, the provincial capital. Pop. 10,300.

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